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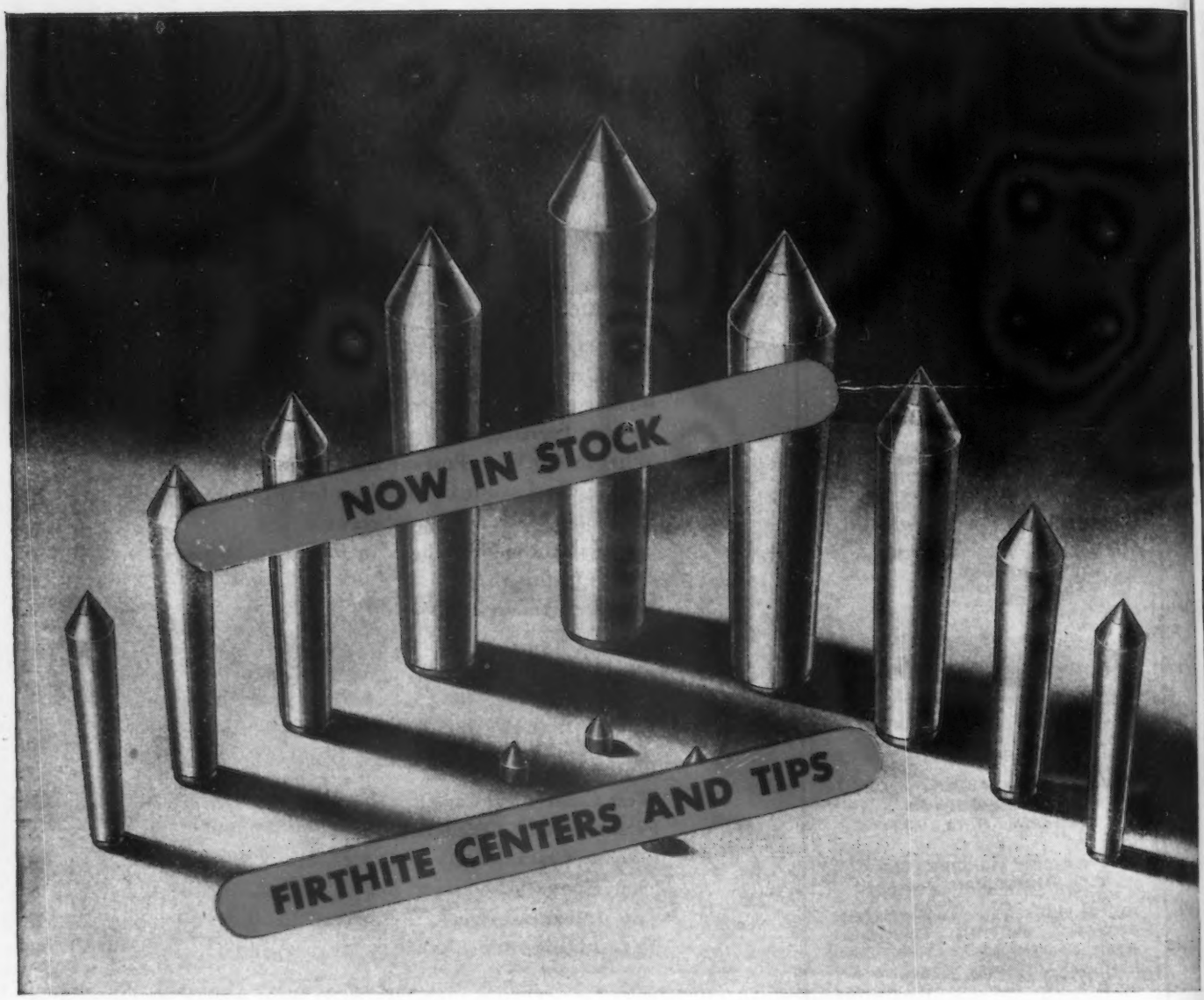

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Trends Toward State Ownership

THE ostrich is a bird that disregards trends. When he sees something approach that he does not like, he does not prepare to meet it or even to run away from it. Instead, he buries his head in the sand and disregards it.

There are a few ostriches among business men, but most want to keep their eyes peeled for storm signals. Hence the popularity of forecasts and economic services that tell them "this or that may happen but on the other hand they may not."

For the benefit of the many of our readers who do not wear expensive tail feathers, I offer a few words about the trends toward state ownership that are either being incubated or that have developed on both sides of the Atlantic. They are identical both in Great Britain and in America.

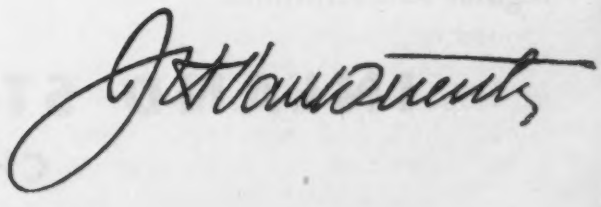
First and most fully developed is taxation. In our own country most of our successful companies (and the unsuccessful ones do not count) are already paying 90 per cent of most of their profits to the government. In the United Kingdom, it is 100 per cent. Stock shares become merely paper symbols of ownership when these overwhelming proportions of the fruits of enterprise are harvested by and put at the disposal of bureaucrats.

Emerging from this as a vicious spiral is the fact that government, as the expropriator of the profits of existing enterprises puts itself in position to become the principal proprietor of new and future business through the process of draining off private investing power and centering it in the state.

Second trend, already well developed in both countries, may be labeled the State Promotion of Great Expectations. Politicians in both countries have led many people to believe that out of the tremendous destruction of wealth and work due to war they may expect better wages; shorter hours; a free insurance policy against all hazards of birth, life, and death; a guaranteed annual income; full employment for everyone, and a higher standard of living through increased purchasing power.

So firmly have these ideas been implanted in so many that when actualities collide head on with expectations in the postwar years there will be a tremendous popular demand for the continuance or even extension of national debit financing which is the only way that, temporarily, we can get something for nothing.

Third trend, now in incubation both here and in Great Britain, is that toward government financing of higher education. Across the water, plans are already being made to have the British Government assume as high as 80 per cent of collegiate financing, while in our own country the same principle is being developed through selectee and proposed veteran education. Excellent in principle as affording free education to those best fitted for it, these plans entail a serious threat to liberty of thought so cherished by our schools of learning. For when government money controls our universities, politicians and bureaucrats will inevitably attempt to dictate what is taught and who teaches it.



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The IRON AGE
November 21, 1944

NEWS FRONT

► Premature emphasis on the reconversion of industry has been attacked by WPB Operations Head H. G. Batcheller. To Batcheller, permit to resume the production of mouse traps or cocktail shakers is not front page news.

► Many of the discussions between automotive companies and the unions center in the problem of reemployment of veterans. A model clause drafted by the UAW last month provides that any veteran who formerly worked in a shop covered by an auto union contract can return to that plant within one year of service discharge with seniority totaling the time worked in the plant plus the time in uniform.

The basic problem in this arrangement appears to be the fact that it will be practically impossible for a previously unemployed veteran to get a job if he must buck a seniority list including not only all persons who worked during the war, but all veterans who had places in plants before the war.

The industry does not feel that unlimited superseniority, as interpreted by Selective Service under which veterans would have job preference over everyone else is practical or fair, but it does feel that certainly the man who went away to war should have at least an equal chance with the man who, because of physical defect or special skill, stayed home to make war tools.

► The homeward trek of many industrialists from the war agencies is of concern to the U. S. Chamber of Commerce. That organization sees a great need for managerial strength in many government agencies.

► Disrupted transportation is a limiting factor in the return of France to industrial activity. Not only must railroads be restored, which will require at least 2000 locomotives and thousands of freight cars, but those roads presently repaired must be in the hands of the Allied military forces until such time as Germany is defeated.

► A new precipitation hardening alloy, analyzing 60 copper, 20 nickel, and 20 manganese, of high corrosion resistance and of attractive silvery color has just been announced. The alloy is soft and ductile for ease in forming, but can be hardened to 400 Vickers by a comparatively low-temperature aging treatment. Tensile strength runs up to 200,000 lb. per sq. in.

► The practice of relying on equal hardenabilities of various grades of commercial cast alloy steels as a measure of interchangeability has proved at best a hazardous procedure.

Tests recently made show clearly that the changes in chemical composition which result in changes of hardenability also alter the tensile strength, yield strength and torque in drilling, in the same direction, and reduction of area, elongation and impact in the opposite direction. However, the relation is by no means sufficiently accurate quantitatively to permit of any close predictions as to what values of any properties may be expected to accompany given hardenability.

► Electrodeposition of nickel for the repair of worn or mis-machined parts, a more common practice in Great Britain than in the United States, is claimed to have an advantage over chromium deposits in its machinability.

All types of nickel deposit may readily be machined by processes suitable for steel and usually the same tools may be used.

► Substitution of broaching for milling on a dozen or so parts of the Garand semi-automatic M1 rifle has reduced the cost of manufacture 57 per cent from what it was three years ago at Springfield Armory. Manhours to produce a gun have been cut in half. Springfield now has the largest installation of broaching machines in the world.

► One of the basic reasons for the current unrest and job dissatisfaction among foremen is the fact that fewer than 40 per cent are positive what their jobs consist of, according to a recently completed survey by the Labor Relations Institute of New York. Many companies which have applied job specifications for production workers have neglected employees in supervisory positions. Similar analysis for foreman jobs are now being proposed.

Hardenability and Interchangeability

WHEN the need of substituting one type of alloy steel for another became acute because of war shortages, it became common to judge the possibility of interchanging one material for another by determining whether their hardenabilities were equal. The method was found to possess a certain degree of utility, but it seems well to consider further how reliable predictions as to physical properties, based on hardenability, can be expected to turn out.

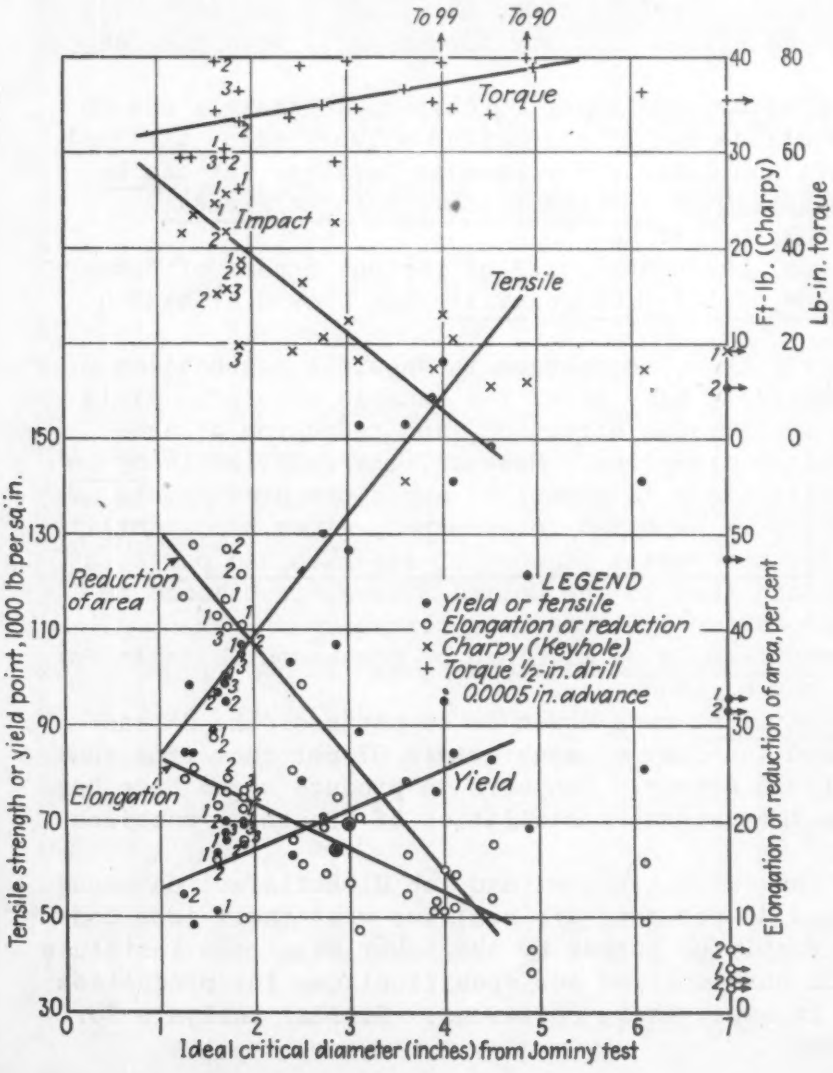
There are, of course, vast differences in the possible interpretation of the concept of interchangeability. These may range from using hardenability as an approximate measure for sorting out which of a number of available materials are more likely to be interchangeable for one which must be displaced, to adoption of specifications based on one steel for another which happens to have the same hardenability. Furthermore, consideration must be given to the limits of accuracy of these predictions in determining whether the design based on one material can, with certainty, be relied upon if another material of interchangeable hardenability be substituted.

As a matter of strict logic, complete interchangeability with respect to all properties cannot be expected of any two steels differing in composition. Schwartz and Bock showed in the AIME Technical Publication No. 1719, 1944, that the form of the mathematical relationship between composition and the change of elongation with strength differs from that for the relation to chemical composition and the theoretical maximum tensile strength. In addition, these relations differ in form from those set up by Grossman in Transactions, AIME, Vol. 150, page 227, 1942, for the effect of elements on hardenability. Despite these facts, there is the possibility that a degree of agreement of sufficient reliability might exist to make substitutions based on hardenability of some practical use.

An experimental verification of the relationship of hardenability to the other engineering properties of interest should be of value for any material, and in this paper such a comparison for a suitable range of alloy steels is presented. There are available for this study, a group of 25 medium carbon low alloy steels, mainly made in the acid electric furnace at the Chicago Works of the National Malleable & Steel Castings Co., but in a few cases made at that company's Sharon Works, either in the acid electric furnace or basic open hearth furnace.

In connection with other more fundamental investigations, the engineering properties of these steels, each in some 20 different conditions of heat treatment, were determined. Among these properties were yield point, if one existed, or yield stress at 0.1 per cent offset if no yield point existed. Ultimate tensile strength, elongation, reduction of area, impact resistance, using the standard keyhole Charpy specimen, and the torque on a ½-in. drill flooded with oil, running at 240 rev. per min. and penetrating the steel at the rate of 0.005 in. per revolution.

FIG. 1—Ideal critical diameters deduced from Jominy curves are here plotted as abscissae and the appropriate engineering properties as ordinates for steels normalized from 1650 deg. F. The considerable scatter of the observed points makes accurate predictions of any property from hardenability impossible.



# of Cast Steels. .

By H. A. SCHWARTZ
Manager of Research,
National Malleable & Steel Castings Co.,
Cleveland

. . . From the results of tests conducted on various commercial alloy steels, the author has concluded that equality of hardenability does not insure accurate or reliable predications as to other physical properties of cast steels. The data presented herein clearly shows that basing steel substitutions on hardenability alone is at best a hazardous procedure.

The number of heat treatments for which comparisons are instituted have been limited and normalizing from 1652 deg. F., normalizing from this temperature followed by a 2-hr. tempering at 1292 deg. F.; oil quenching from 1508 deg. F., after normalizing from 1652 deg. F., followed by tempering for 2 hr. at 1292 deg. F. or 752 deg. F. respectively, have been adopted as typical of the approximate range of properties in which the engineer might be interested. Heat treatments were made on specimens approximating 1 in. in diameter or 1 in. square. All the recorded results are the averages of reasonably concordant duplicate determinations. Hardness determinations were made in duplicate on previously normalized steel by the usual Jominy method, except that miniature specimens were used according to the technique described by A. E. Focke in THE IRON AGE, Sept. 3, 1942, page 58.

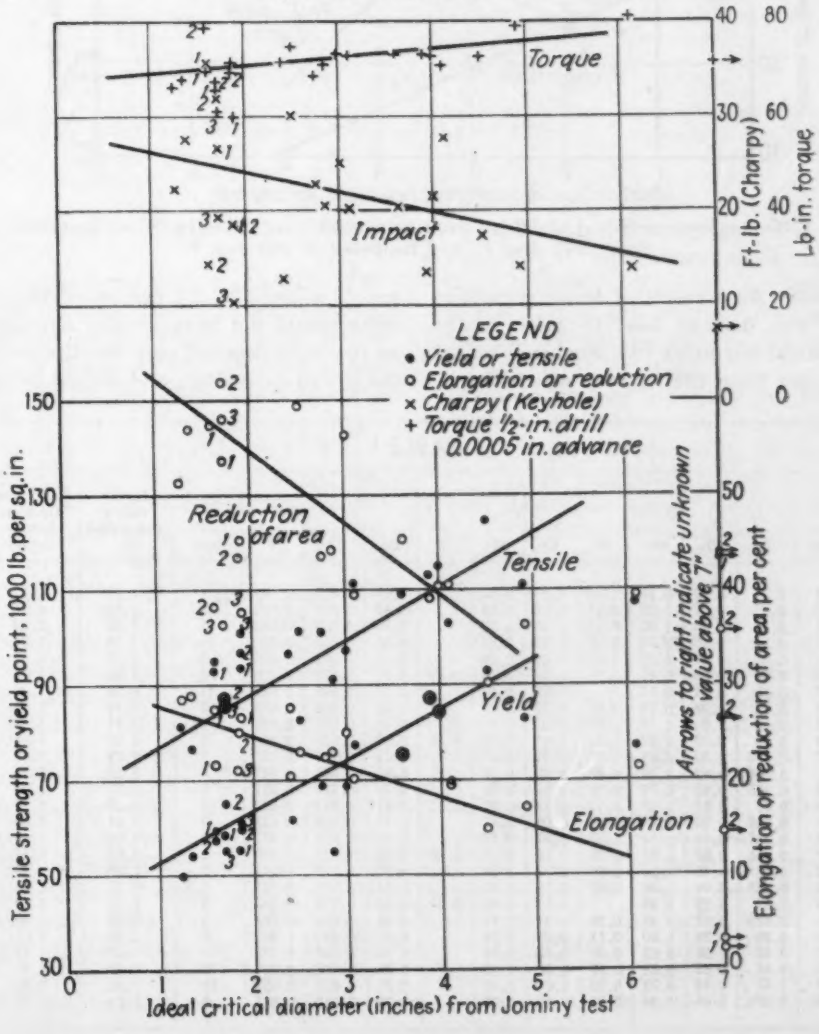
Determining Critical Diameter

There arises some difficulty in deciding upon the quantitative measurement of the hardenability of a given steel whose Jominy curve is known. This hardenability is usually expressed as the ideal critical diameter, which purports to represent the diameter of a cylindrical specimen so long that end-effects may be excluded, whose central axis would become one-half martensite and one-half troostite, if the surfaces were instantaneously cooled to room temperature and held there. The numerical value of the ideal critical diameter can be calculated from Jominy curves by methods described by Asimof, Craig and Grossman in the Journal of the Society of Automotive Engineers, in 1941, page 282. There is involved, however, the question of recognizing where along the Jominy specimen the steel is half martensite and half troostite. Three methods are available: Direct metallographic observations; macro-etching, which shows a sharp difference in acid attack on each side of this boundary; and calculation of the hardness of the expected structure, for recognition of the proper zone from such calculation.

Unfortunately in cast steels, at least, the material is never half martensite and half troostite, there always being some rejection of ferrite. This confuses both the metallographic and the macro-etching procedures. The critical hardness varies with the carbon and alloy content of the steel, and Grossman has given data as to its expected value under various circumstances. His data, however, leave room for choice.

C. H. Junge in the author's laboratory made comparisons between various possible criteria for critical hardness and the agreement of the results with Grossman's chemical calcula-

FIG. 2—Similar graphic presentation as in Fig. 1 for steels normalized from 1650 deg. F. and tempered below A1.



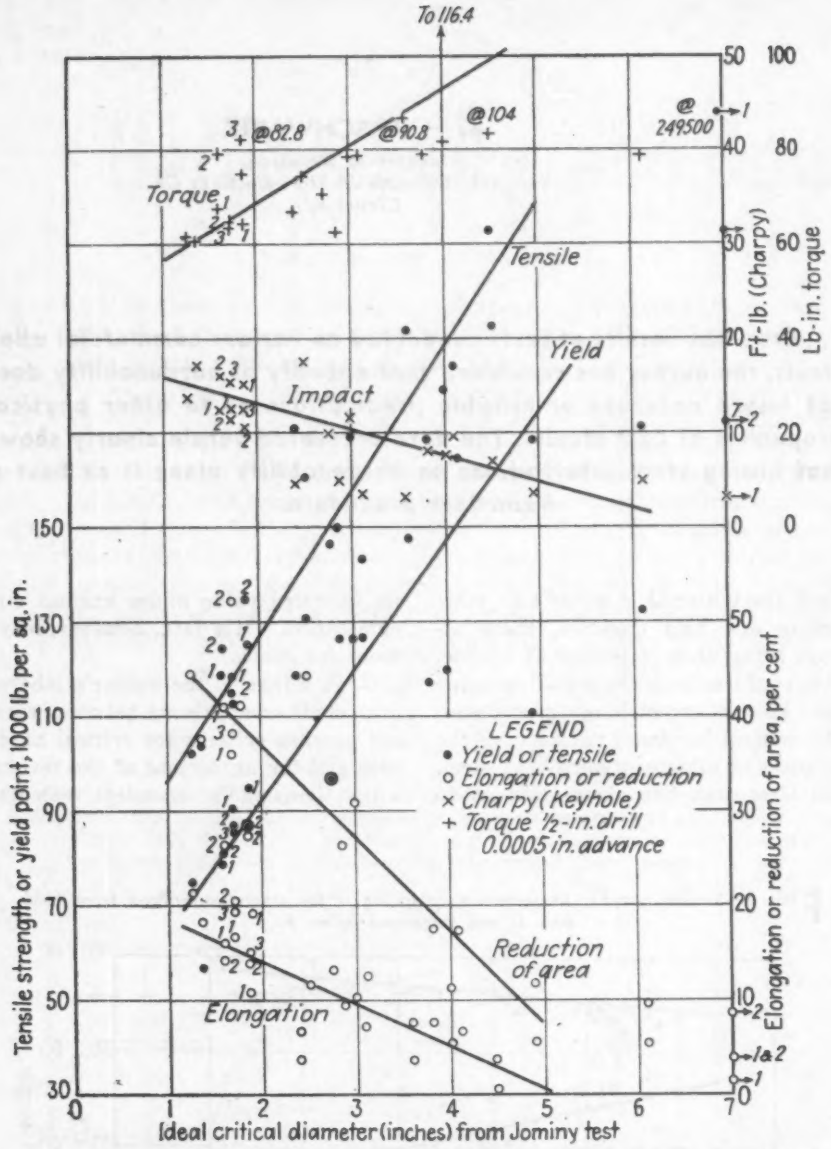


FIG. 3—Same as Figs. 1 and 2 for steels normalized from 1650 deg. F., oil quenched from 1500 deg. F., and tempered at 750 deg. F.

tions. As a result of this comparison it was deemed best to take as the critical hardness two Rockwell points higher than the highest which Grossman's criteria would permit. The results would not have greatly changed as to concordance if only one Rockwell point had been used, and indeed using five points more than Grossman's value for plain carbon steel would have produced fairly good agreement.

It need not be emphasized that if there is any doubt about the critical hardness value, that doubt is reflected in the ideal critical diameter and carries over into any comparison of other properties with that diameter. This feature must be borne in mind before deciding to use hardenability as an accurate measure of any other engineering characteristic.

Commercial Grades Tested

The choice of steels investigated was dictated to a considerable extent by commercial considerations. There was more interest in investigating steels suggested for various commercial uses rather than investigating a logical series in which the various alloys were systematically varied. This was necessitated in part by the need for making full size commercial heats to obtain the necessary test specimens; it being deemed inadvisable to rely upon small size experimental heats. Incidentally, to cover the whole series of observations, about a ton of steel of each kind was required to produce the coupons and their feeders in sufficient number for the complete study. The composition of the 25 heats, the grain sizes and their ideal critical diameter as calculated by Grossman's methods, considering also Grossman's own revisions with respect to the effect of nickel, and Feild's simplification for the effect of chromium* as well as the ideal critical diameter derived from the author's own Jominy observations, are all summarized in Table I.

Before proceeding with comparisons of hardenability and the various observed properties, it may be pointed out that the temperatures used in the heat treatments were in some cases necessarily modified slightly in order that normalizing or quenching temperatures be above A_3 or in order that the normalizing temperature listed as 1292 deg. F. should be close to A_1, but not above it.

In Fig. 1 the ideal critical diameters deduced from Jominy curves are plotted as abscissae and the various appropriate engineering properties as ordinates for the plain normalized steels; in Fig. 2 similar arrays of figures are plotted for normalized and tempered steels; in Fig. 3 for normalized and oil quenched, tempered at 752 deg. F., and in Fig. 4 normalized,

* *Metal Progress, March, 1943, page 402.*

TABLE I

No.	C	Si	Mn	Ni	Cr	Mo	V	Cu	S	P	Grain Size	Grossman's Calculated D_I	Calculated D_I from Jominy Curves
1	0.31	0.44	0.71	3.35	0.02	0.03	....	0.07	0.031	0.028	8	2.75	2.87
2	0.33	0.37	1.20	0.65	0.02	0.02	....	0.10	0.034	0.031	9	1.60	1.70
3	0.38	0.43	1.43	0.01	0.03	0.02	....	0.10	0.038	0.030	8	1.88	1.87
4	0.24	0.30	0.74	0.03	0.02	0.39	....	0.05	0.035	0.030	10	1.38	1.35
5	0.36	0.32	0.73	1.67	0.54	0.26	....	0.04	0.036	0.029	9	4.23	4.10
6	0.25	0.28	0.81	1.37	0.02	0.10	0.09	0.07	0.032	0.026	8	1.95	1.70
7	0.32	0.41	0.81	....	0.08	0.04	....	0.10	0.037	0.033	11	0.98	1.27
8	0.23	0.38	0.74	0.81	0.27	0.22	....	0.03	0.028	0.030	10	2.12	1.60
9	0.35	0.34	1.18	0.02	0.03	0.02	....	0.10	0.031	0.035	9	1.35	1.70
10	0.40	0.39	0.67	0.22	1.44	0.47	0.15	0.12	0.025	0.039	8	6.50	7+?
11	0.395	0.89	0.46	1.00	0.04	0.27	....	0.02	0.026	0.037	7	2.29	2.40
12	0.365	0.42	1.20	0.68	0.05	0.28	....	0.06	0.031	0.037	8	3.57	2.75
13	0.385	0.48	0.74	0.16	1.12	0.33	....	0.09	0.020	0.035	6	5.77	4.00
14	0.40	0.51	1.58	0.12	0.12	0.08	0.13	0.11	0.032	0.034	8	3.50	3.80
15	0.395	0.38	1.50	0.09	0.06	0.41	....	0.12	0.035	0.033	8	4.46	4.50
16	0.355	0.42	1.34	1.33	0.33	0.10	....	0.12	0.033	0.031	10	4.24	3.60
17	0.395	0.52	1.51	0.08	0.16	0.21	0.09	0.25	0.036	0.040	8	5.67	6.10
18	0.38	0.45	1.34	0.04	0.07	0.03	....	0.03	0.026	0.013	9	1.69	1.87
19	0.355	0.44	1.26	0.07	0.11	0.11	....	1.64	0.028	0.031	9	3.45	3.10
20	0.32	0.29	1.30	....	0.03	0.43	0.09	0.05	0.019	0.032	9	3.65	2.50
21	0.325	0.47	1.41	0.06	0.38	0.11	....	0.02	0.030	0.026	8	3.46	3.00
22	0.39	0.39	1.60	0.12	0.05	0.34	....	0.81	0.040	0.040	9	4.88	7+?
23	0.52	0.58	0.83	0.01	0.02	0.06	....	0.10	0.037	0.032	8	1.59	1.87
24	0.44	0.65	0.88	0.02	0.02	0.49	....	0.35	0.042	0.040	10	3.20	4.90
25	0.42	0.40	0.75	0.03	0.01	0.16	....	0.11	0.038	0.037	10	1.35	1.60
26	0.325	0.44	1.46	0.01	0.05	0.08	....	0.10	0.024	0.041	8	2.21	2.27

oil quenched and tempered just below the critical point.*

**To make it possible for the reader to correlate the points in the various tables with the particular steels in question when several steels have the same hardenability, the points representing steels equal in hardenability have been numbered in the same sequence in which the steels fall in Table I. The arrows pointing toward the right at an ideal critical diameter of 7 are intended to represent the fact that it is known that the corresponding properties are for steels of higher ideal critical diameters without having the actual values of these diameters.*

The trend lines of these four figures have been drawn in by inspection only. It would, of course, be an obvious improvement to compute these lines by least-squares methods. This refinement seems needless.

It is plain in all of the charts that there is a very considerable scatter of the observed points. Under these circumstances an accurate prediction of any property from hardenability would be rash and the labor of computing an exact coefficient of regression wasted.

Close Predictions Impossible

Inspection of the four charts shows clearly that while the changes in chemical composition which resulted in changes of hardenability also altered the tensile strength, yield strength and torque in drilling, in the same direction, and reduction of area, elongation and impact in the opposite direction, the relation is by no means sufficiently accurate quantitatively to permit of any close predictions as to what values of any properties may be expected to accompany given hardenabilities.

It would be of interest to examine whether, with a considerably more rigid interpretation of interchangeability, steels of equal hardenability can, by changes of heat treatment, be caused to produce similar variations of several of the other properties combined in one material. This may best be examined in the light of a comparison of tensile strength and elongation. It was shown by Schwartz and Bock* that for steels receiving a given type of heat treatment (normalized or quenched) a graph of the relation between tensile strength and elongation for the particular steel when these properties are varied by heat treatment, forms a straight line.

Included in the investigation were three steels having an ideal critical diameter of 1.87 in., and three others having an ideal critical diameter of 1.70 in.

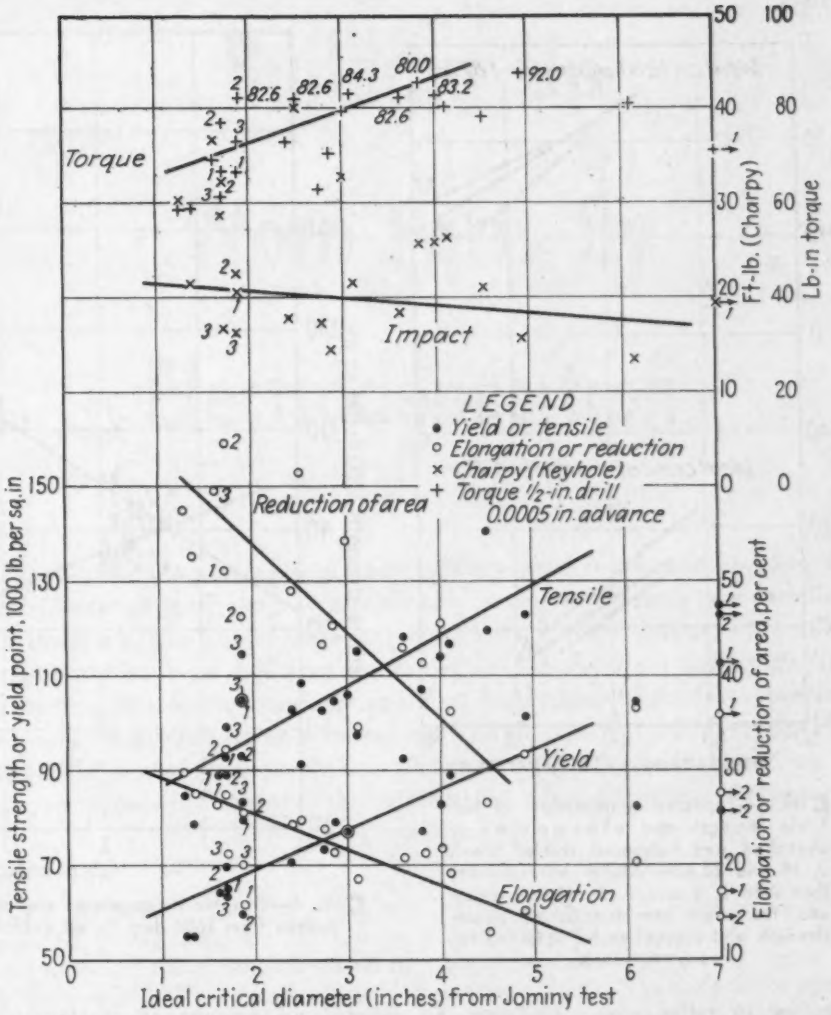


FIG. 4—Scatter of physical properties for steels normalized from 1650 deg. F., oil quenched from 1500 deg. F., and tempered just below A1. Legend as in Fig. 2.

In Fig. 5 the lines representing, by least squares, the expected combinations of tensile strength and elongation in quenched and tempered steels, are plotted. One group contains steels Nos. 3, 18 and 23 of the higher hardenability, steels Nos. 2, 6 and 9 having the lower hardenability. It will be seen that in neither group can the same combination of tensile strength and elongation be obtained for any two steels. It seems unnecessary, therefore, to pursue the subject into other combinations of properties since those best known are incapable of exact duplication pairwise in steels of different composition.

It seems, therefore, a most hazardous proceeding to substitute one steel for another merely because the two have the same hardenability. The fairly extensive series of tests from which the present data are abstracted show quite clearly that one may have very different engineering properties for apparently similar hardenability. It is not impossible that this condition might be remedied with greater knowledge of what constitutes the critical hardness. This merely leads into the field of the interpretation of hardenability curves and so beyond the scope of this article.

Investigations by others, so far unpublished, have given no reason to believe that the hardenability of cast steels differs materially from that of forged steels of equal composition. This suggests an investigation of the engineering properties of the present steels in the forged condition.

Since it is no part of the writer's present purpose to discuss in detail the relation of hardenability to the other properties of forged steels, it will be well, for the sake of brevity and clarity to confine the discussion only to forged steels in one state of heat treatment, and only to tensile strength and elongation. All of the steels described, except No. 21, were available also as forged bars which had been reduced, usually about 70 per cent, in area, in forging from the cast state. This amount of hot work is, of course, much smaller than that

* *"Tensile Properties of Medium Carbon Low Alloy Cast Steels," Technical Publication No. 1719, AIME.*

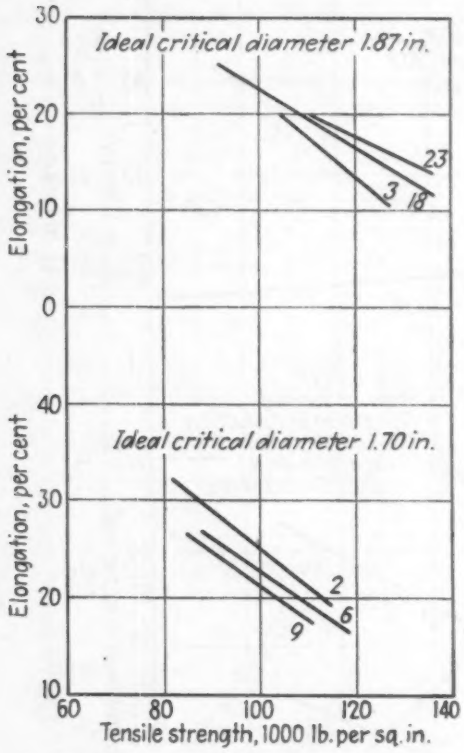


FIG. 5—Expected combinations of tensile strength and elongation in quenched and tempered steels. Steels 3, 18 and 23 have higher hardenability than Nos. 2, 6 and 9. In neither group can the same combination of tensile strength and elongation be obtained for any two steels.

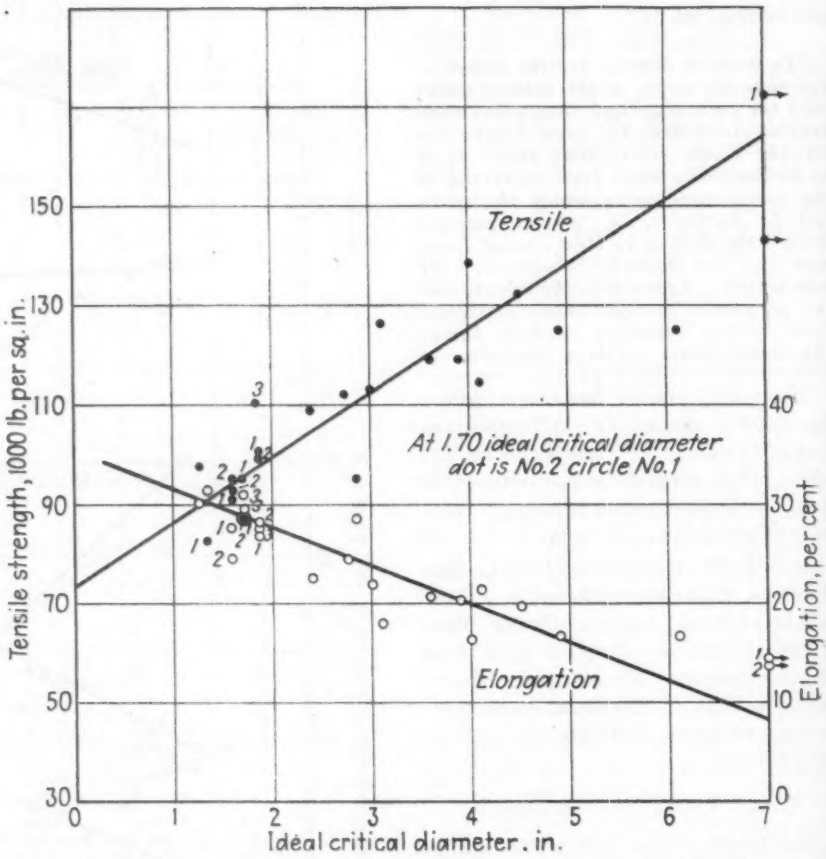

Tensile
Elongation
At 1.70 ideal critical diameter dot is No.2 circle No.1
Tensile strength, 1000 lb. per sq. in.
Elongation, per cent
Ideal critical diameter, in.

FIG. 6—Graphic arrangement similar to Figs. 1 to 4, but for forged steels, normalized from 1650 deg. F., oil quenched from 1500 deg. F., and tempered at 1115 deg. F.

applied to rolled rods. However, a comparison of this amount of work with the unworked steels should give some useful conclusions.

The heat treatment selected for comparison was normalizing from 1652 deg. F., re-normalizing from 1508 deg. F. and tempering at 1112 deg. F.

Fig. 6 is a graphic arrangement precisely similar to Figs. 1 to 4 inclusive, but applying to this forged material. It will be seen that there is still an amount of scatter, not greatly different from that observed for the cast steels, although in the case of the very hardenable steels the agreement seems to have improved in the case of the forged material.

The information presented should make it possible for the reader to make up his own mind whether hardenability is sufficiently closely correlated with the properties he desires to use, so that he feels safe in using it as a measure of interchangeability. The reaction of the writer is that this is possible only where any close duplication of properties is no requisite.

Acknowledgment

Thanks are due to W. Kenneth Bock, formerly engineer of tests in the research department of the National Malleable & Steel Castings Co., and now in the Engineer Corps of the United States Army for conducting the investigations from which data of this paper were drawn.

New Organic Bonding Material

ELECTRIC motors performing all their normal tasks while immersed in gasoline or other fluids are pictured as entirely possible with Goodyear Tire & Rubber Co.'s newly-developed Pliobond, an organic cement. A number of Pliobond-sealed motors are already in use in aircraft fuel tanks and elsewhere. The Pliobond is used to seal the joints in the motors' metal cases to prevent gasoline or other fluids from seeping inside.

Other recently-perfected new uses for the cement include bonding synthetic rubber to metal in airplane carburetors and of a synthetic rubber band to glass, ceramics and metal in ordnance equipment to provide a flexible seal against water and moisture vapor seepage. Sheet rubber is being attached also with Pliobond to vitrified abrasive wheels for elimination of vibration and noise.

Other current uses of Pliobond include adhering wood and plastics to metal in special radio-testing equipment and the cement is being tried experimentally in laminating lead foil, paper and fabric. Results of other experiments indicate that cabinets, doors and shipping boxes can be made with wood sealed to metal by Pliobond. Another possibility is Pliobond's use as a pipe-thread sealing compound.

Laboratory tests with Pliobond have indicated that excellent bonds are obtained to various materials such as wood, metals, plastics, fabrics, ceramics, vulcanized rubber, paper, leather, plaster and concrete. These tests have shown that in cases where flexible materials are adhered with Pliobond to rigid surfaces of glass, Bakelite or hard rubber, a pull of 35 lb. is required to strip off a sample 1 in. wide. In shear tests on materials such as glass, metals or rigid plastics, Pliobond joints withstood more than 60 lb. per in. of width.

Building Up Worn Parts By Electrodeposition

By A. W. HOTHERSALL
M. Sc. Tech., Metallurgical Branch, Armament Research Dept., British Ministry of Supply

. . . Chromium plating has been widely used in the United States for the salvage of worn or mis-machined parts. Though less familiar to industry, the use of heavy nickel offers certain advantages over other methods of building up surfaces for repair. Citing British practice, the author reviews some of the technical factors relating to electrodeposition in general and contrasts the relative advantages of nickel and chromium plating. This article is based on a paper presented before the Institution of Mechanical Engineers, London.

ELECTRODEPOSITION of iron as a method of repair was introduced during the war of 1914-18 when it was applied in Army repair work shops in France. Since that time considerable progress has been made in the knowledge and control of the process of deposition, and nickel has superseded iron because it is easier to control and the properties of the deposit are more desirable. Chromium deposition has also been introduced and the scope of the process is now much wider. Of particular interest at the present time is the use of electrodeposition for repairing parts spoiled during manufacture by over-machining. Experience has shown that production schedules can be maintained with appreciable savings in manhours even by small plants of moderate cost. Small parts cheaply produced on automatic machines may not be worth while saving, but the process becomes more economic with increasing part cost. The following figures apply to a typical component:

	Minimum	Maximum
Cost before scrapping	$200	$280
Scrap value	20	20
Loss if scrapped	180	260
Cost of repair, including machining	32	32
Net gain	$148	$228

With few exceptions, electrodeposition is a satisfactory method of repairing worn or over-machined parts[1] of machines, vehicles, engines, guns, etc. Examples of breech mechanism parts of guns spoiled by improper machining and repaired by electrodeposition of nickel are illustrated in Figs. 1 and 2. The area built up is usually small, and other surfaces are insulated from electrodeposition with a coating of wax.

Mechanical properties and the adhesion of the deposit must be suitably controlled by the plater if the process is to be successful. During the war, a number of British and American plants have been producing adherent and durable heavy deposits of nickel.

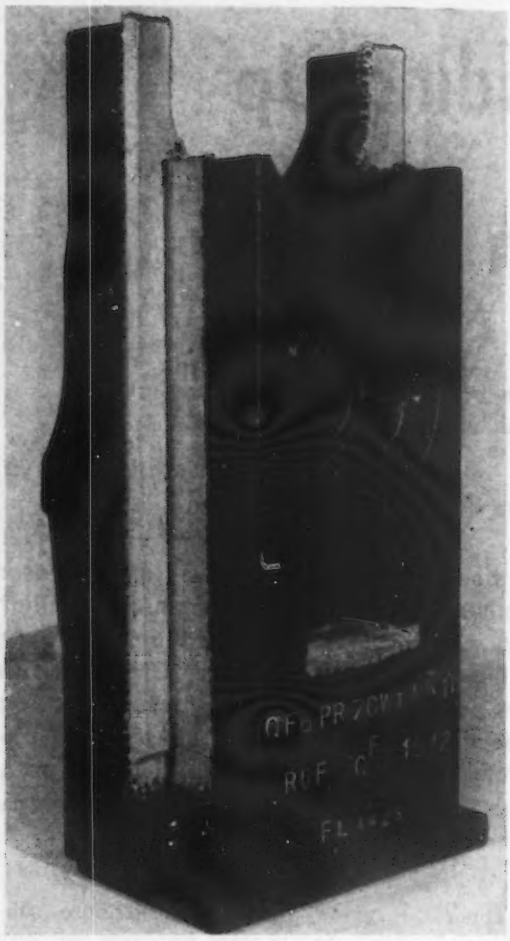
Hardness and Strength of Deposits

The indentation hardness of electrodeposited metals is normally higher, sometimes very much higher, than that of the same metal as cast or annealed. The Vickers diamond pyramid hardnesses of nickel and chromium as deposited in commercial practice are within the ranges of 250-450 and 750-950, respectively. Fig. 3 compares the hardness ranges of electrodeposited metals with those of cast or cold worked metals. Values shown represent plated coatings of appreciable thickness. Higher values can be obtained by cold working the plated parts.

The causes of the high hardness of electrodeposited metals have been investigated. While the subject is controversial the presence of hydrogen in the metal has never been conclusively proved to contribute substantially to the hardness of any electrodeposited metal and there is evidence that it has little direct effect on some electrodeposits. Some years ago Macnaughtan and his colleagues expressed the opinion that hardness of electrodeposits is mainly due to small grain size, probably coupled with the effect of included non-metallic material in a critical state of dispersion.

The tensile properties of electrodeposited metals may be determined by building up a thick coating, for example 0.15 in. on one or both sides of a sheet of metal treated to prevent the deposit from adhering firmly. The coating is stripped off, milled flat if necessary, and cut into flat pieces for tensile test. Tests have also been made on round test pieces machined from thick electroformed sheet. Care must be taken that deposits are free from pits or large growths in order to prevent abnormally low results because of local failures. Exact correlation of mechanical properties of electrodeposited metals is not usually possible because of the difference in structure between starting and finishing faces. The crystals of the deposit are usually columnar and oriented at right angles to the plane of testing. Such crystals are smaller near the starting face and the deposit there is stronger, harder and often more

[1] Heavy nickel plating is also used for corrosion protection of steel and cast iron in thicknesses as great as 1/16 in.



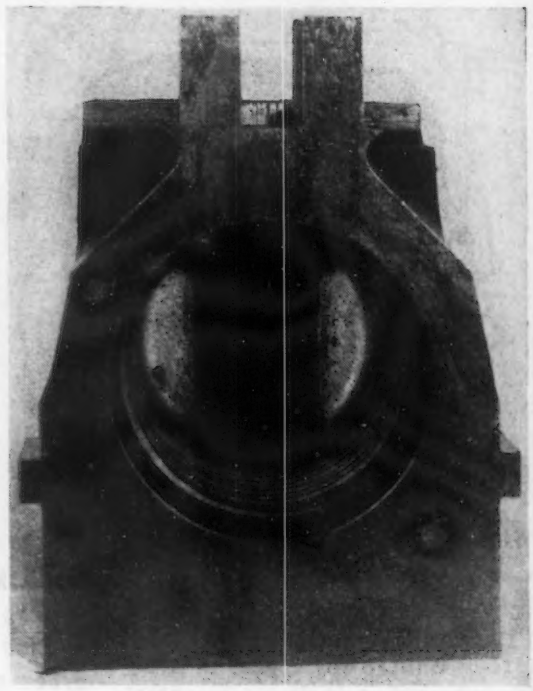
LEFT

FIG. 1 — Gun breech mechanism part repaired by heavy nickel plating after having been mis-machined. The electrodeposit has not yet been machined.

° ° °

RIGHT

FIG. 2 — Repaired breech mechanism part showing electrodeposit of nickel on a recessed surface, before machining.



ductile. Typical results of tensile tests of electroformed nickel and copper are given below:

	Ultimate Strength, Lb. per Sq. In.	Elongation, Per Cent
Nickel, soft	62,720	35
Nickel, hard	123,200	6
Copper	44,800 to 56,000	40 to 55

Adhesion of Deposit

Adhesion of electrodeposited metals is a subject upon which many inaccurate statements have been made because of confusion between practice for decorative plating, where considerations of adhesion must be subordinated to those of appearance and cost, and that for building up for engineering purposes.[2]

It has now been established that under properly controlled conditions the deposit and base are united by forces of atomic nature. Under ideal conditions the force required to separate the two metals would be equal to that needed to rupture the weaker of the two. Fracture would not occur at the joint since there is some interpenetration of the lattices and it is likely that at the interface the lattice would be strained and therefore stronger than normal. That this condition is achieved in practice can rarely be demonstrated,[3] but it can be shown to be approached by a test of the type illustrated in Fig. 4. Typical values obtained from this test are shown in Table I.

[2] Stopping off and pre-plating treatments for heavy plating are quite different from similar treatments for decorative plating.

[3] The cold chisel test is said to be simple and dependable for testing adhesion.

Experience shows that once the technique of the process has been properly mastered, few failures are due to faulty adhesion. Where failure does occur it is usually due to improper procedures. Strongly adherent deposits on certain metals are not yet practicable but in some instances they are sufficiently adherent to withstand stresses likely to be encountered in service. This is summarized below:

Relative Adhesion of Electrodeposited Coatings on Metals and Alloys

Strong Adhesion

No special difficulty in processing:
- Mild steels
- Structural steels, low alloyed, not hardened
- Copper
- Brasses, unalloyed
- Nickel

Special processing needed:
- Steels containing tungsten
- Bronzes
- Brasses alloyed with tin, phosphorus, iron, manganese, etc.
- Aluminum

Medium Adhesion

Possible failure under severe local stress, but suitable for ordinary service:
- Stainless steels
- Cast irons
- Chromium steels, case-hardened
- Steels, nitrided
- Aluminum alloys, some

Poor Adhesion

Unsuited to heavy plating if stresses in service tends to detach electrodeposits:
- Aluminum alloys, most
- Magnesium alloys

Roughening the surface does not improve the adhesion of any but very poorly adherent or non-adherent deposits. It can, in fact, be shown that very strongly adherent deposits can less readily be formed upon rough surfaces than upon smooth ones.

Volume-Change Stresses

Most electrodeposited metals undergo a change in volume after they have been deposited. Nickel and chromium deposits tend normally to contract, although certain nickel deposits expand. Zinc deposits normally expand. The relative expansion or contraction of electrodeposited metals is summarized in Table II. Comparisons were made by plating one side of a piece of spring steel strip, 4 x 0.2 x 0.015 in., and observing the movement of the strip during or after deposition.

The contraction of nickel deposits may be sufficiently marked to produce

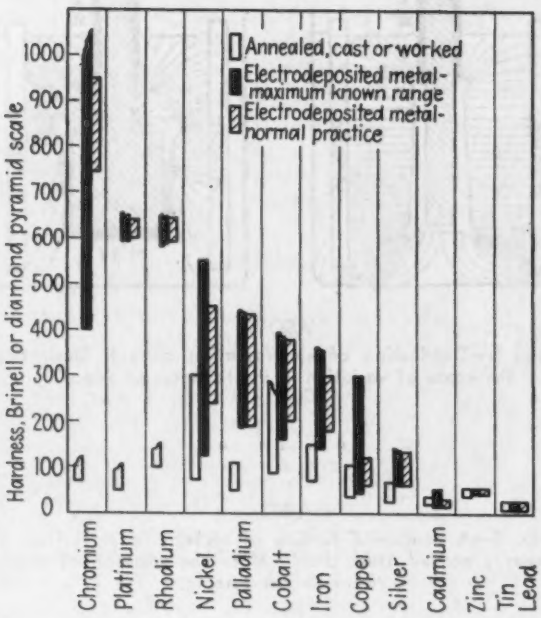


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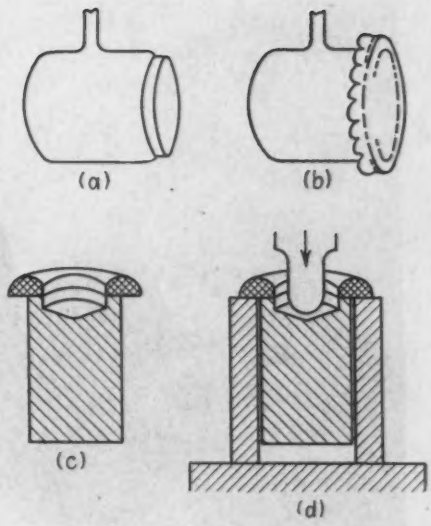
FIG. 3—Relative hardnesses of electrodeposited metals.

o o o

RIGHT

FIG. 4—Ollards adhesion test for electrodeposited metals. a—A cylindrical test piece is stopped off with wax. b—A thickness of 0.1 in. minimum is deposited on exposed end. c—The wax is removed and the deposit machined. d—The adhesion of the annulus of deposit is then determined in a suitable testing machine by measuring the load required to detach it from the specimen.



rupture of the coating; it varies in degree with the type of solution, the temperature and acidity of the electrolyte and the presence of impurities in it. With suitable control of the process, stress is only of practical importance when an appreciable thickness of coating is to be applied to an article of thin section or when the factor of safety in fatigue strength is not high, since the stress in the coating may be added to the applied stress. In the latter case a coating must be chosen of such properties that the fatigue strength is not seriously affected. Low temperature treatment of the coating tends to cause an increase in the curvature of spring steel strips plated on one side only, indicating an increase in the contraction of the deposit.

Uniformity of Deposit

Electrodeposited coatings are even in thickness only under ideal conditions that are seldom realized in practice. With suitable arrangements a sphere could probably be evenly coated. On articles of irregular shape, prominent areas, particularly those with sharp edges, receive larger deposits while cavities receive less than average deposits. The effects of uneven primary current distribution tend to be modified by electrochemical factors such as cathode polarization, conductivity of electrolyte and current efficiency. Electroplating solutions are therefore said to have different throwing powers. Poor throwing power may seriously limit the effectiveness of heavy deposition, particularly with chromium plating solutions. Illustrations of the effects of uneven distribution of electrodeposit are shown in Figs. 6 to 9.

To some extent distribution of nickel or chromium deposits can be controlled. In deposition, non-conducting shields of wax or plastic sheet can be employed to prevent excessive deposit on the edges; or conducting shields can be used to rob prominent corners of deposit. Auxiliary anodes are sometimes necessary. Nickel solutions have better throwing power than chromium solutions. But throwing power changes with composition of solution and conditions of operation and is to some extent subject to control by the operator. The use of well-buffered solutions at low pH and high current density with agitation is conducive to poor distribution. Where particularly good throwing power is important, it is advantageous to choose a less well buffered solution at moderately high pH value, with medium current density and without agitation. The use of oxidizing agents in solutions is detrimental.

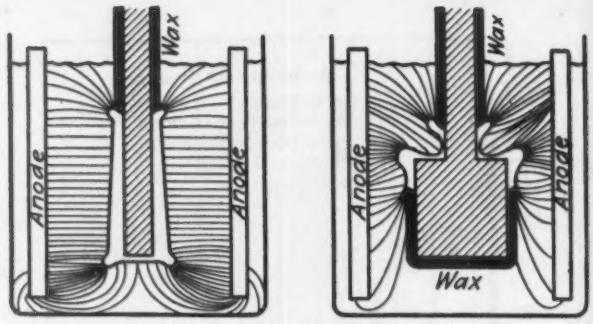
How Deposits Affect Steel

A sound adherent coating adds to the tensile properties of the base to which it is applied in proportion to its thickness and its properties relative to those of the base. The effects of nickel deposits upon standard tensile test pieces to British Standard Specification No. 5005 are given in Table III. Round tensile test pieces 0.357 in. dia. were machined down by 0.038 in., then built up with electrodeposited nickel and remachined to plan size. Thus 20 per cent of the cross-sectional area was nickel.

From the table, it will be seen that the ductility of hard and soft steels

TABLE I
Adhesion Strengths of Nickel Electrodeposits

Underlying Metal	Adhesion, Lb. Per Sq. In.	Location of Fracture
Mild steel, rolled bar	62,720	In steel
3 per cent nickel steel, forged	71,680	In steel
Nickel chromium structural steel, hardened and tempered	47,040	In steel, near interface
Case-hardened steel	49,280	In steel, near interface
Cast iron (pearlitic)	15,680	Near interface
Nickel-coated mild steel	62,720	In nickel
Copper, extruded rod	41,440	In copper
Brass 70-30 Cu-Zn	52,640	In brass
Brass 60-40 Cu-Zn	43,000	In brass
Phosphor bronze	33,600	In phosphor bronze
Aluminum	7,840	In aluminum
Hot-dipped tin coating on mild steel	4,030	In tin coating
Electrodeposited lead coating on mild steel	2,240	In lead coating



ABOVE

FIG. 6—Distribution of electroplating current, illustrating the cause of variation in the thickness of deposit.

° ° °

LEFT

FIG. 5—A composite turning of nickel and steel from a heavily coated steel shaft. Note the absence of separation in the turning.

is increased by the soft deposit, and that the ultimate strength of a hard steel is reduced and of a soft steel increased by the hard deposit.

The resistance of a steel test piece to an alternating bend test in air—the Wohler fatigue test—may be appreciably reduced by the presence of an electrodeposited coating of nickel or chromium. The effect appears to be associated with the following factors:

(1) Properties of the coating—its strength and ductility, its freedom from cracks and from local defects liable to result in cracks on flexing, also the degree to which stress is present in the coating
(2) Thickness of the coating
(3) Surface finish of the coating
(4) Mechanical properties of the steel
(5) Degree and type of etching applied to the steel in preparing it for electrodeposition.

The subject is complicated, and therefore difficult to discuss briefly without inaccuracy. The following notes are based on results of tests of the effect of coatings up to 0.005 in. thick on Wohler test pieces 0.4 in. in dia.

A very strong smooth coating of nickel or chromium having little or no internal stress has reasonably little effect on the fatigue strength of a 90,000 to 110,000 lb. steel, and may even increase fatigue strength. But highly stressed and mechanically weak deposits of nickel may reduce fatigue strength by as much as 50 per cent. Normally stressed deposits of nickel have been found to reduce the fatigue strength of the same steel by about 25 per cent.

Chromium electrodeposits appear to reduce the fatigue strength of steel less than nickel, but the effect of chromium on fatigue strength appears from published information to increase with the strength of the steel. The conditions of chromium deposition are less likely to exert effect than conditions of nickel deposition, since they are usually controlled for deposits of maximum hardness.

Further work is in progress and there appears to be some prospect of specifying conditions of deposition which should not lead to appreciable reduction in fatigue strength. In the meantime, the effects of electrodeposited coatings on components subject to high alternating stresses in service should be borne in mind. Under corrosive conditions, protection afforded by the coating may outweigh other factors and the repaired article may be substantially more resistant to fatigue than a bare steel article.

Electrodeposition of certain metals, among them nickel, cause hydrogen embrittlement of the steel base. The effect is temporary and can generally be substantially, if not entirely, removed by low temperature treatment after the deposition—½-hr. at 300 to 480 deg. F. If necessary a temperature of 212 deg. F. can be used but may be less effective. Embrittlement is usually only of importance in salvage work for its effect on the adhesion of the deposit, since it is not likely to be objectionable otherwise on any but thin sections. It is advisable to stipulate that all parts should be subjected to low temperature treatment after heavy electrodeposition.

TABLE II
Expansion and Contraction of Electrodeposited Metals

Metal	Bath	Linear Expansion or Contraction of Deposit
Chromium	Chromic acid	Strong contraction
Cobalt	Sulphate	Strong contraction
Copper	Acid sulphate	Nil or slight expansion or contraction
Iron	Sulphate	Slight to strong contraction
Lead	Perchlorate	Expansion
Nickel	Sulphate	Expansion to strong contraction
Silver	Cyanide	Slight contraction
Tin	Oxalate	Slight contraction
Zinc	Sulphate	Expansion
Zinc	Cyanide	Expansion

Repair By Electrodeposition

Electrodeposition is satisfactory, with few exceptions, for the repair of worn or mis-machined parts of machines, vehicles, engines, guns, etc. Only nickel and chromium are in common use for building up mismachined parts. Chromium has an advantage because may firms are experienced in its deposition or have

plant which can be readily adapted to the purpose without considerable change. However, the deposited metal is glass-hard and can only be finished by grinding. It is extremely brittle and its rate of deposition is less than that of nickel, especially on shielded or recessed surfaces. The high hardness of chromium is of great value where a hard, wear-resisting surface is required but, because of its machinability, nickel is generally superior for reclaiming mis-machined parts.

The wide range of hardness obtainable with electrodeposited nickel[4] has already been mentioned, but the choice of hardness of deposit for a particular purpose is often less important than might at first be supposed because nickel rapidly work-hardens under sliding action and the wear resistance of deposits of different initial hardness is similar. For surfaces subject to heavy pressure or local hammering, it is advisable to specify a hard deposit. Due to the danger of scoring, nickel plating alone is not recommended for surfaces sliding in contact with steel under heavy pressure. Chromium, or a duplex deposit of nickel with a chromium facing, are usually satisfactory for such surfaces. Application of nickel to glass-hard or case-hardened surfaces should not be attempted without expert advice.

All types of nickel deposit may readily be machined by processes suitable for steel. Usually the same tools may be used, but better results are obtained with generous front and side rake angles (20-25 deg.) and greater front clearance. Nickel work hardens readily and is tough. It is therefore essential that it should be cut and not scraped. Some difficulty is occasionally experienced with metal building up on the tool tip. This can usually be overcome by polishing or stoning the chip flow surface, and chromium plating the tool is often found to be advantageous.

A clear indication of the surface to be repaired is a convenience to the plater, but painting with oil colors is objectionable as the paint is difficult to remove. A statement of the minimum deposit required to build up the most badly worn or mis-machined area of the surface is also needed; it should err on the generous side to avoid scant deposits. Nevertheless it should be remembered that the time required and the price charged for the repair increase with the thickness of deposit. A description of the type of steel from which the part is made is a great help.

[4] A plating bath suited for heavy and hard deposits of nickel has been patented by Dr. W. A. Wesley, International Nickel Co., Inc. (U. S. Pat. 2331751).

FIG. 7—Sharp angled rebate. a—Inadequate deposit in corner, before and after machining. b—More uniform deposition with fillet.

FIG. 8—Comparison of distribution of deposit in narrow slot or blind hole and wide slot or blind hole, before and after machining.

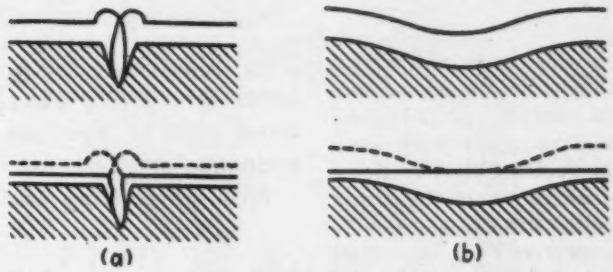


FIG. 9—Deep score. a—After heavy plating, and machining. b—By blending defect before plating it can be eliminated.

Rate of Deposition

There is no theoretical limit to the thickness of nickel which can be applied, and there are no significant changes of properties or strength of adhesion with thickness of deposit. The time and difficulty of deposition increase, however, with the thickness of deposit. As a general rule thicknesses of 0.05 to 0.1 in. of nickel or 0.01 in. of chromium are the economic limits. Precise figures cannot be given for the rate of deposition, because the effective rate is usually that at which the deposit builds up at its thinnest point and this depends upon the shape of the article. The average theoretical rate of nickel deposi-

(CONCLUDED ON PAGE 114)

TABLE III
Comparative Properties of Steel With and Without Heavy Nickel Electrodeposits

Core Metal		Nickel Deposit		Tensile Properties		
Description	Vickers Diamond Hardness No.	Description	Vickers Hardness No.	Jenkins Bend Values*	Ultimate Strength, Lb. per Sq. In.	Elongation Per Cent
Mild steel	183	None	...	...	94,080	14.0
		Soft	170	125	88,930	18.0
		Hard	280	43	100,350	12.5
Nickel chromium steel, hardened and tempered	286	None	...	...	141,120	18.7
		Soft	194	125	126,560	20.4
		Hard	315	43	131,040	9.8

* Determined separately. The figure given is the product of the thickness in thousandths of an inch (usually 7) and the number of reverse bends through 180 deg. over a radius of 0.04 in. to produce fracture.

Electric Furnace Brazing Being Widely Extended

By H. M. WEBBER
Industrial Heating Division, General Electric Co., Schenectady

. . . Concluding the article begun last week, the author illustrates other interesting examples of where electric furnace brazing has been able to produce stronger and less costly components for ordnance and aircraft than formerly obtained. A new type of combination brazing and heat treating furnace is also described.

IN the days when there was a critical shortage of aluminum, furnace brazing of steel stampings enabled the Homelite Corp., East Port Chester, Conn., to successfully substitute steel for cast aluminum in the design of a small cooling fan. In addition to giving equal performance, the steel fan actually weighs less than the aluminum one, the steel fan weighing 2.75 lb. and the aluminum fan 3.06 lb.

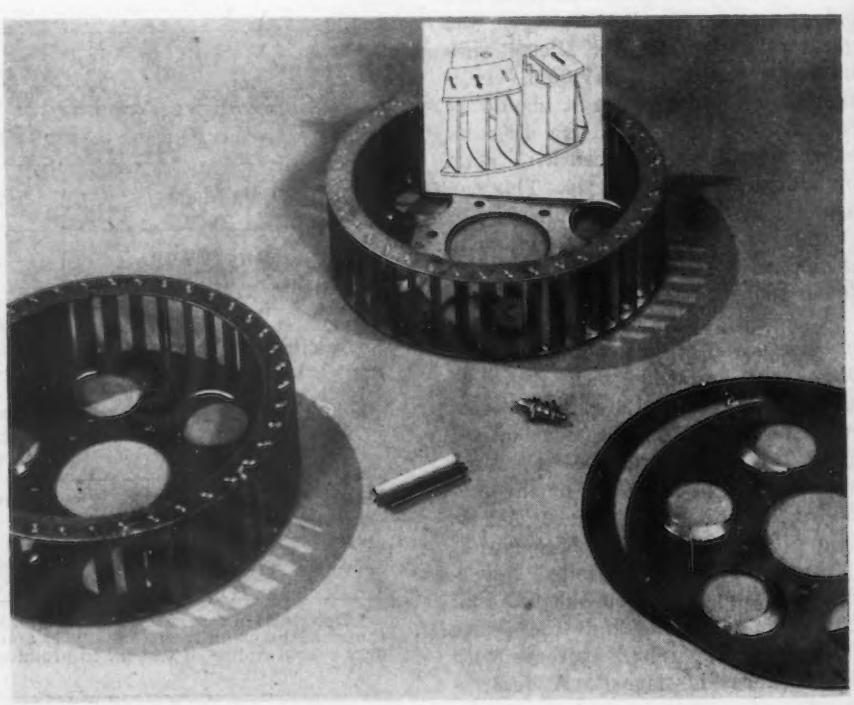
The fan is used to cool both a single cylinder, two-cycle gasoline engine and a direct-coupled 2000-watt generator, rotating at about 3600 r. p. m. The fan is mounted on the end of the crankshaft and is between the engine and the generator. The complete outfit is an auxiliary power unit used on all large bombers and combat tanks. Due to the impulses of the single cylinder, two-cycle engine, the cooling fan is subjected to severe tortional vibrations. The centrifugal force resulting from the high speed at which the fan rotates introduces additional stresses.

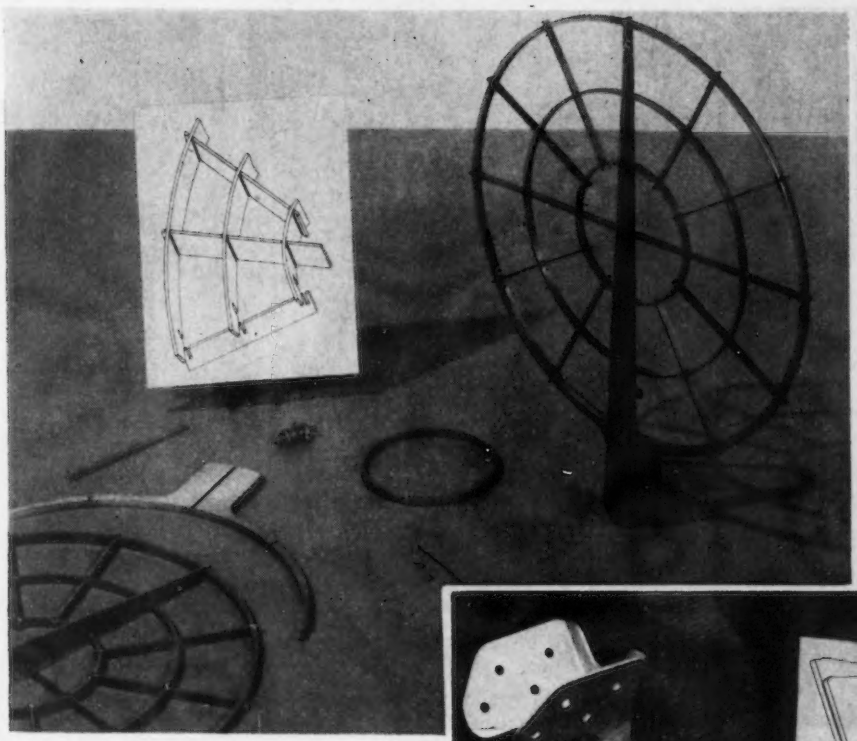
When the conversion to steel was originally made, the 8 in. diameter fan consisted of a stamped disk, a ring and 40 vanes. Slots were indexed around the disk and ring into which short tabs, projecting from each end of the curved vanes, were assembled and peened to keep them in position. Cold working of the SAE 1010 sheet steel induced stresses in the metal, particularly in the large disk, resulting in distortion of the assembly. Peening the ends of the vanes caused embrittlement at these points, resulting in fatigue failures which allowed the vanes to fly while the fan was rotating at high speed.

To overcome these difficulties, the disk was stiffened by spot welding a stamped steel spider on one side. This not only eliminated the distortion but improved the strength. Copper brazing the assembly in a controlled atmosphere furnace relieved all stresses and provided strong bonds, which eliminated fatigue failures and flying out of the vanes. Therefore, this fabricated furnace-brazed assembly gave highly satisfactory service.

Fig. 13 shows a sight for the Oerlikon 20 mm. anti-aircraft gun, made by the Ironite Ironer Co., Detroit, and furnace brazed by the National Stamping Co., Detroit, which is a jobber in this type of work. Originally, the part was made of sheet stock with holes drilled in proper locations and pieces cut out by hand with hacksaws. Obviously, this was slow and laborious and the results were rather crude. Then the part was designed as an as-

FIG. 12—Furnace brazing of this cooling fan for gasoline engine generators, made of 43 stampings riveted or spot welded together, permits trouble-free operation at high speeds.





ABOVE

FIG. 13—Production was speeded up and quality improved by furnace brazing this gun sight made of steel stampings having 37 joints.

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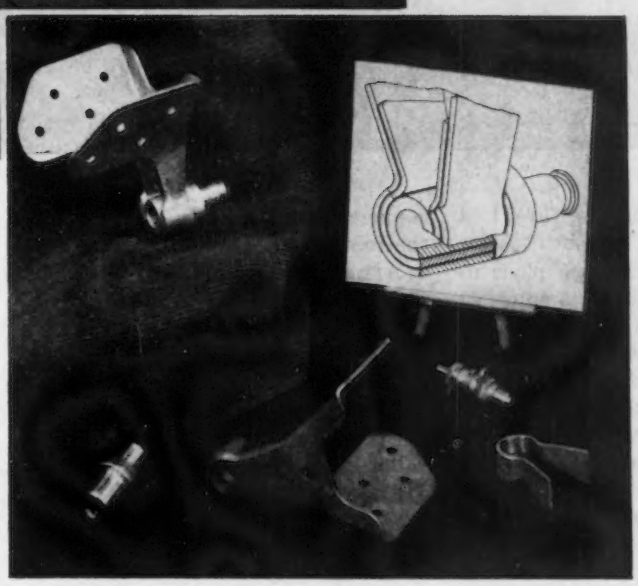
sembly made of stampings, its construction being shown in Fig. 13, and torch brazed by hand. This resulted in considerable improvement by speeding up production and improving the quality, but further strides in this direction were made when the job was converted to furnace brazing with copper, in that labor is now at a minimum and the quality is all that can be desired.

Preparation of the assembly for furnace brazing consists of placing small U-shaped pieces of 0.025 in. copper wire diagonally across all intersections of the various members, except for the wide steel strip that runs through the center, alongside of which a straight piece of 0.030 in. copper wire lies on the mounting projection and U-wires rest on intersected members. The latter straight and U-wires are struck in place with clear lacquer. Then the 37 joints are copper brazed in a single trip through a small mesh-belt conveyor furnace which brazes 60 assemblies per hr. Thus the speed of production and small amount of labor involved are fairly obvious. The assemblies are smooth, clean and bright as they come from the furnace, ready for subsequent operations, with no oxides or flux to remove. In addition, the assemblies have very strong bonds which are said to withstand vibration from the guns exceedingly well.

Replaces Die Casting

An airplane part, formerly a manganese bronze die casting with steel pin, is now made of two SAE X4130 steel stampings and a screw-machine part, as shown in Fig. 14. It is the bomb door roller support bracket for the Consolidated B-24 Liberator bomber. Each plane requires over 100 brackets.

The furnace brazed assembly is made of three parts: the body, the "hairpin doubler" and the pin. The body is first pierced, then blanked and



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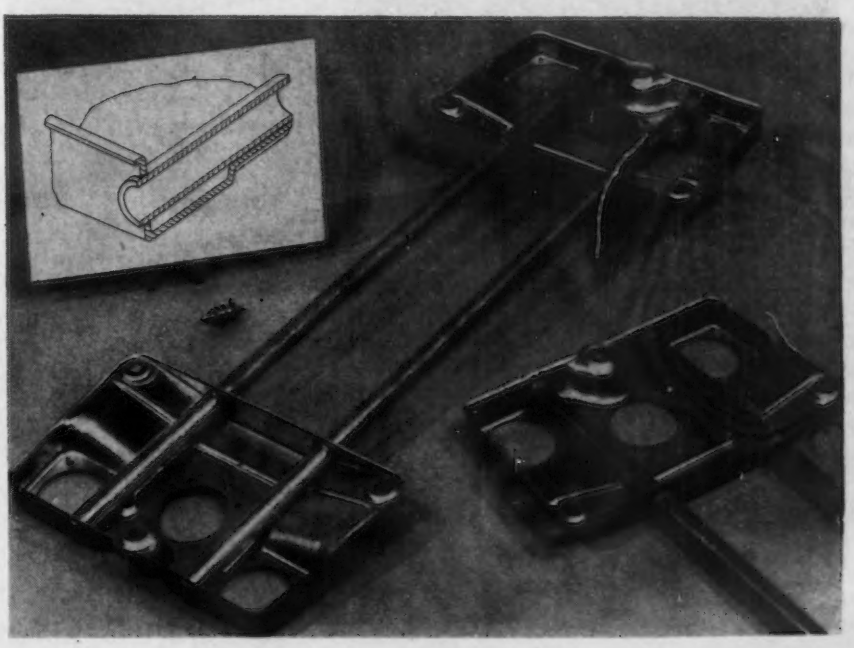
LEFT

FIG. 14—Formerly a die casting, now made of steel stampings and a screw machine part, this airplane bracket is now stronger, lighter and less expensive.

o o o

BELOW

FIG. 15—This steel shock absorber and base assembly for radio transmitters was formerly torch brazed. Now all 12 joints are furnace brazed in one operation, reducing the brazing cost about 50 per cent.



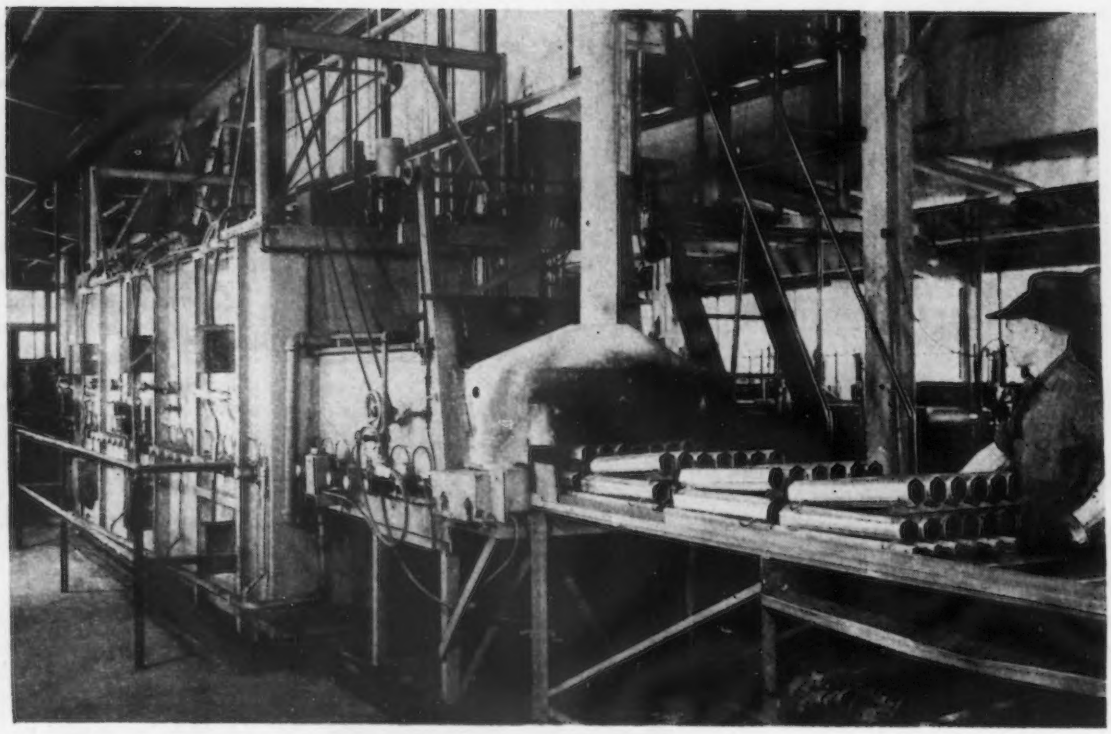


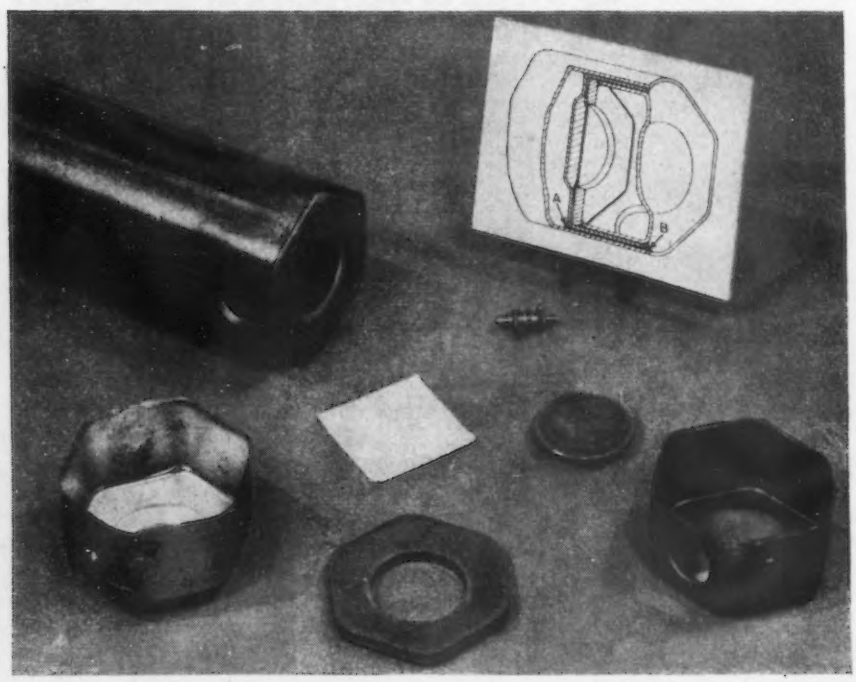
FIG. 17 — Thirty incendiary bomb casings double decked on each of two trays await entry one trayload at a time, into roller-hearth conveyor type copper brazing furnace. Charging and discharging is completely automatic. The furnace has heating chamber 17 ft. long, cooling chamber 70 ft. long and is rated 320 kw.

formed. The hairpin doubler is blanked and formed in such shape that it must be sprung into place in the body to assure a uniform snug fit. The surfaces of both parts are grit blasted before assembling in order to assure good wetting by the copper on this steel, which is otherwise slightly unresponsive to wetting because of the chromium, manganese and carbon it contains. Cleaning and roughening the surfaces with steel grit improves the wetting qualities and draws the copper along the surfaces and into the joints by capillary attraction.

After the hairpin doubler is assembled in the body, the hole for the pin is reamed so as to compensate for variations in thicknesses of the sheet stock and assure a snug, metal-to-metal fit with the pin.

The assemblies are copper brazed in roller-hearth electric furnaces at the Warner Mfg. Co., Glendale, Cal. After brazing they are heat treated to 125,000 to 145,000 lb. per sq. in. tensile strength. In comparison with the manganese bronze die castings, they have greater strength, are much lighter in weight and less costly.

FIG. 16—The steel casing for the M-69 oil incendiary bomb (upper left) is an ingenious assembly of the five parts shown in the foreground inserted into a sheath of hexagon steel tubing and copper brazed in continuous electric furnaces.



Formerly Torch Brazed

The brazing cost has been reduced about 50 per cent on a shock absorber and base assembly for radio transmitters, Fig. 15, by changing from torch brazing to furnace brazing. The torch brazing was a time consuming method in that each of the 12 joints had to be heated individually, the operators had to turn the assemblies to several positions during the brazing for accessibility to the joints, flux had to be applied and the flux deposit and scale removed after brazing, and a straightening operation was necessary because of distortion which occurred during the brazing. Now, operators simply daub a mixture of copper powder, lacquer and thinner around and along the joints, and all 12 joints are brazed at once as the assemblies pass continuously through mesh-belt conveyor-type electric furnaces. Also, the assemblies are usually straight and flat and the straightening operation has largely been eliminated. As a result, production has been speeded up, the strength is equally as good as before and the appearance is considerably improved. The labor formerly employed has been released to do other important work, and attractive savings have been made in the cost of this job.

The shock absorber and base assembly is made up of two SAE 1010

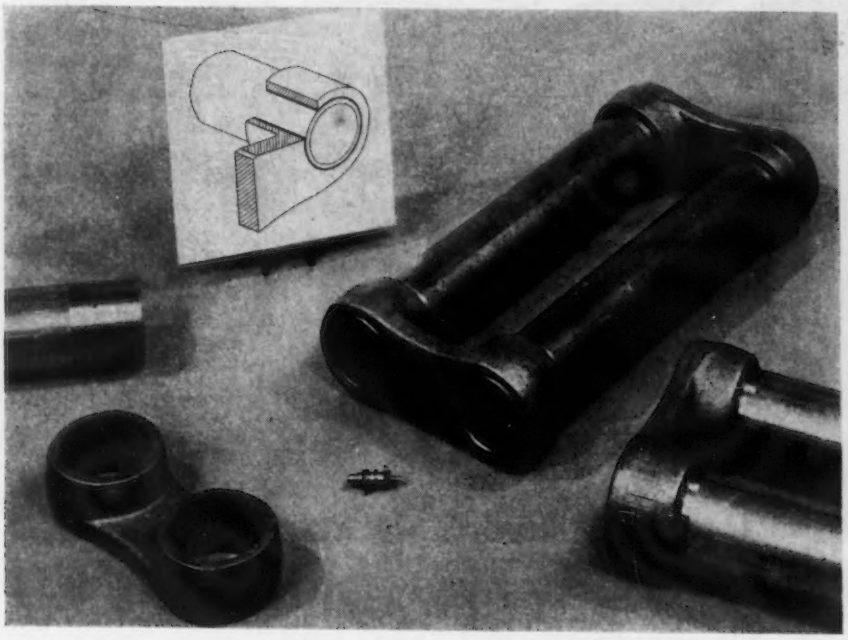


FIG. 18—Millions of these tank track bodies (center) have been copper brazed in continuous furnaces for high strength and low cost.

steel stampings, 0.015 in. thick, each approximately 4½ in. wide x 8 in. long into which are pressed two pieces of ½ in. o.d. steel tubing, about 20 in. long. It is manufactured at the Schenectady Works of the General Electric Co.

Example of Capillary Attraction

An excellent example of the effect of capillary attraction in drawing brazing metal up through uniform, snug joints is found in the furnace brazing of the M-69 oil incendiary bomb casings, Fig. 16. For example, copper in the form of wire slugs, a wire coil or scrap punching laid in the bottom of the assembly at point *A* in the inset sketch, creeps longitudinally in the bottom between the outer hexagon steel tube and the adjacent drawn steel cup, called the sealing diaphragm. When the copper reaches the end of the assembly at *B*, it forms a fillet as shown, bridging the gap between the heavy hose cup and the outer hexagon tube caused by the 0.008 in. wall thickness of the sealing diaphragm between the two. Having bridged this gap with the fillet, the copper then creeps back almost the same distance in the opposite direction to the point where the nose cup butts against a 3/16 in. thick hexagonal washer.

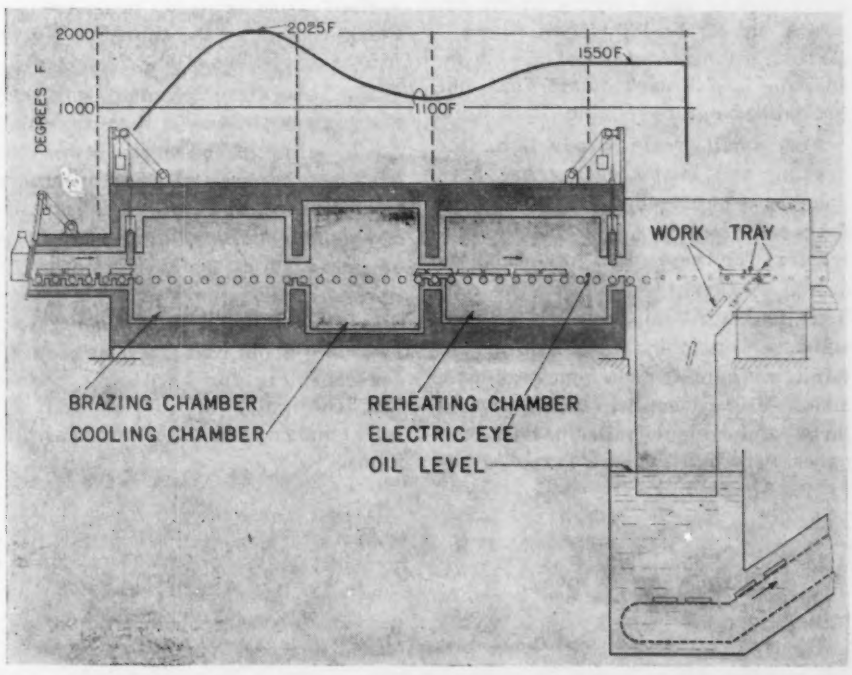
At this junction, the copper creeps up and around the joint by capillary attraction, leaving a fillet in the corner along all six sides of the washer. In the meantime, the copper also creeps all the way up through the joints outside and inside the sealing diaphragm, making a uniform, tight seal completely around the casing. Some manufacturers of these casings have made an attempt to facilitate the flow of copper by introducing holes in the walls of the sealing diaphragm to short circuit the long path described above.

All five metal parts of the assembly are made of SAE 1010 steel. Ordinary copper is used as the brazing metal and it can be employed in any convenient form, the only requirement being that sufficient quantity will be supplied to fill all the joints and make the fillets.

There is an asbestos-paper spacer between the steel slug and the washer to keep these members separated so that they will not become brazed to one another. Even though the chamber formed by the assembly of drawn cups is vented with a large hole, enough water vapor is driven out of the asbestos spacer to contaminate the protective atmosphere within this chamber and impair the wetting of the steel by the copper. To overcome this undesirable effect, some contractors apply a small quantity of copper powder carried in some vehicle such as lacquer or oil, to the inner joint of the chamber at the bottom so that it can creep around and help form the fillet. Another scheme which has helped the wetting considerably is to drop a pellet of charcoal into the chamber to react with the water vapor to make hydrogen and carbon monoxide which are highly reducing. Inner surfaces, otherwise darkened by the water vapor with resultant poor wetting, are thus transformed into bright, clean surfaces with good wetting and good fillets.

Typical of the electric furnaces in which these casings are copper brazed is the roller-hearth type shown in Fig. 17. It is installed at the Niles Steel Products Div., Republic Steel Corp.,

FIG. 19—This new combination furnace was developed for copper brazing, partially cooling, reheating and quenching tank track bodies, all done automatically without intermediate handling, according to the approximate temperature curve shown at the top.



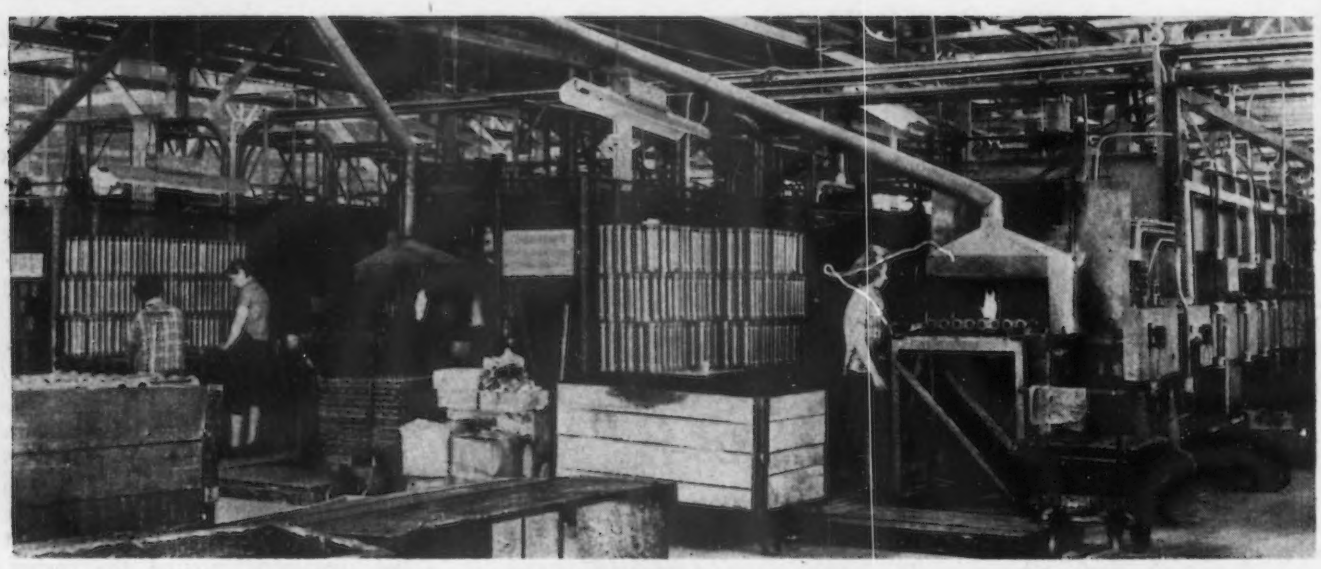


FIG. 20—Tank track bodies are shown being automatically charged into two combination roller-hearth copper brazing and heat-treating furnaces, each rated 352 kw. Numerous such furnaces have stepped up and facilitated production.

Niles, Ohio. Thirty casings are loaded per tray, double decked and slightly inclined to encourage the flow of brazing metal downward into the joints. Trayloads of work travel continuously through the heating and cooling chambers and are automatically charged and discharged through the normally closed doors at the extreme ends. A typical furnace, rated 320 kw. and about 100 ft. in overall length, brazes about 525 casings or 2200 lb. gross per hr., including the work and trays, at 2050 deg. F.

New Type Furnace

The assembly which has utilized more furnace brazing capacity than any other during the last two years is the track body, Fig. 18, a tank track part consisting of two steel tubes and two steel forgings which are copper brazed and heat treated, then molded in rubber. Years ago, such parts were made of forgings, but the furnace brazed assemblies were found to have greater strength due to certain construction details, as well as lower cost. Other fabricating methods have been tried but the bulk of the production is still being furnace brazed. The service to which these furnace brazed track bodies are put is extremely severe and they withstand this punishment admirably well.

The assemblies are about 12 in. long by 6 in. wide by 2½ in. high, weighing 8.6 lb. Ends of the 1⅞ in. o.d. tubes are centerless ground and holes in the forgings are broached to give a press fit of about 0.002 in. interference. An interesting detail is the manner in which the brazing metal is applied. Rings of 0.062 in. copper wire were originally used around the tubes at the joints. It was found that the rings warped enough to cause the brazing metal to collect in lumps at the bottoms of some of the tubes a half inch or so away from the joints, instead of creeping into the joints. This trouble was almost completely overcome by using half rings on the top side, instead of whole rings. These half rings, which actually are slightly more than half in order to provide a clinging action, stay in place so that the copper is drawn into the joints as it melts, by capillary attraction. The copper also spreads over part of the outer face of each forging at the opposite end of the joint from where it started, giving a means of visibly inspecting the brazed joints that has proved to be quite reliable.

For small scale production, the brazing and heat treating has been done in separate batch type electric furnaces. However, the larger contractors for these parts have been required to turn them out by the millions, making it important to use continuous electric furnaces in order to minimize handling as much as possible. To accomplish this, several large and unique roller-hearth furnaces were built. These furnaces automatically braze at about 2025 deg. F., partially cool to about 1100 deg. F., reheat to about 1550 deg. and quench in oil, all in controlled atmosphere. From the deep quench tank the track bodies are delivered bright and clean up to floor level. It is simply necessary for an operator to load the assemblies with preplaced copper wires onto trays at the charging end of the brazing chamber; another operator takes them, brazed and heat treated, off the quench-tank conveyor at the discharging end. Transfer of the trays into the furnace, into and out of the quenching chamber and out of the water-jacketed cooling chamber, as well as movements of the hinged-table quenching mechanism, are entirely automatic. Figs. 19 and 20 show roller-hearth furnaces of the type described brazing and heat treating track bodies at the Burgess Norton Mfg. Co., Geneva, Ill.

The operating economy of these furnaces is obvious in that intermediate handling of the work between the brazing and heat-treating operations is eliminated, and the heat absorption of the material is minimized by virtue of the fact that the carriers are light in weight and the brazed parts and trays are only partially cooled, thus retaining about half the heat required for reheating for hardening. Excellent continuity of service and low maintenance are also substantial items.

▼ ▼ ▼

What to Do With

Postwar Excess Plant Capacity

. . . Since the last plants built are the best equipped, it is the old plants that should be considered excess in the postwar years—not the new ones. The author cautions, however, that before a decision is made as to their retention, these new plants should be appraised from the point of view of their position with respect to material, labor and product markets. Some enlightening observations on wartime depreciation procedures and their effect upon corporate taxes are also made by Mr. McDonald, who discusses his whole subject from the controller's point of view.

By L. D. McDONALD
Vice-President, Warner & Swasey Co., Cleveland

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SUPPOSE that a man who lived all alone on an island found the island so infested with rats that it threatened his survival. Suppose he sent for 100 first-class rat traps for which he paid a total of $200. Suppose that by the use of these rat traps he caught and killed every last rat on the island, thereby relieving himself forevermore from the threat of rats. And then suppose, on the next morning, the tax assessor came around.

What value should that tax assessor place upon those rat traps?

This is not an academic question. A company borrows $3,000,000 and puts up a plant to make a product needed only for war. Then the war is won. What is the postwar value of that plant?

From a resale standpoint? Only what it will bring in the junk market.

From an operating standpoint? Not a wooden nickel. In fact, it would be a liability.

To the nation? Something, perhaps, as insurance against a future war.

To the lender — government or bank? Three million dollars, if the loan is collectible.

There are no overall standards, no rules of thumb, that can be applied to the financial problems of postwar excess capacity.

First of all, take the case of facilities built for war, that cannot be adapted to the manufacture of any type of peacetime product. An example might be machines used to bore the barrels of long-range guns. On the day peace comes plant capacity of this nature can hardly even be termed "excess." It would be more accurately called "unusable."

What Will the Value Be?

Now let us consider facilities devoted to the production of war products today, but the major portion of which can be reconverted after the war for the manufacture of peacetime products. An excellent example is the automobile and automobile parts industry, which can probably retool for peace just as it retooled for war. In the case of facilities such as these—what is going to happen to values after the war? What is the tax assessor going to say? To what extent will these facilities represent *excess* plant capacity?

By way of answer, let us ask ourselves some questions.

What are we headed for after the war is over? A collapse of government credit and a gigantic depression?

Or will the need for supplying our own pentup domestic requirements and rehabilitating a devastated world lead us to the greatest period of manufacturing activity and prosperity that our country has ever seen? If the latter should prove to be the case —what type of industrial facilities will be most in demand?

We have learned, in this war, how to use old materials in new ways and how to use new materials in ways never hitherto imagined. We have learned how to do production jobs in ways never imagined before. We have learned how to change design, methods, and personnel at a rate far beyond past experience.

And before the war started we had ready, in the laboratories of this country, new products, new methods and new materials that even at that time bid fair to revolutionize the whole industrial product picture.

Can we possibly foresee, today, just what type of facilities will best fit into the postwar competitive scramble?

Research and invention, like time itself, go on 24 hours a day. No matter under what type of political economy a country may operate, some brilliant youngster in the back end of a laboratory, overnight, may obsolete millions of dollars' worth of equipment.

All these points are being raised to emphasize that it is impossible for any of us today to attempt to lay down broad general principles as to postwar excess plant capacity.

But it is most emphatically urged that every company, right now, should begin to review its own particular picture in the light of postwar possibilities. This question is discussed here not from the standpoint of designing, marketing, or production, but from the standpoint of the auditor and the controller concerned with the ever-perplexing question of dollars and values.

First of all, it is urged that the auditor and the controller, who perhaps may be statisticians at heart, take stock of what might be termed the intangibles in connection with postwar considerations.

Let us assume that a company, under the stress of war needs, has financed, by its own money or by gov-

ernment money, a substantial addition to its plant. The question ahead of that company is whether it should seek to retain that new plant after the war, or dispose of it. In this connection, there are some questions that have to be answered before an auditor, controller, or a certified public accountant can even begin to get into the picture—because those questions do not have to do with money but have to do with people and geography.

For instance—here is a brand new plant—very desirable from an operating standpoint.

But how is it located with respect to the labor supply?

How is it located with respect to materials?

How is it located with respect to markets?

If no such plant were in existence, would the company decide to build a new plant in that location?

If the answers to these questions are in the negative, why should that plant be purchased and retained by the company after the war is over? Well, there may be some considerations which are peculiar to an individual company's picture.

For instance—a new war plant added to a company's facilities may be so located that it can only be run as a part of that company's operations—and, therefore, there is little choice in the matter. It is simply a question as to coming to an agreement as to purchase price.

A new plant, financed by government or the DPC, might possess certain advantages desirable to the parent company—such as, let us say, a railroad siding or the fee ownership of a strategic piece of land.

And here is an entirely different consideration. Suppose a company had operated during the war a fully equipped DPC plant, making the same product that it intends to make when the war is over. Would the company want that plant to go on sale so that a competitor could buy it and set up in business at its very doorstep? Before jumping to conclusions let us examine the converse of that situation. It might be that instead of exercising its option to buy the DPC plant, the company might prefer to let that plant go by the boards and, instead, buy in the open market a similar plant at some other location, put on the market by the government after the war was over.

The first necessity, therefore, for any company endeavoring to make a decision as to whether it should or should not retain a new wartime-financed plant is that of a practical survey as to the desirability of that plant from the standpoint of labor, transportation, markets, materials, and any other special considerations which may be involved in the picture — as weighed against the purchase price.

Now, when we get down to the matter of a purchase price, we get back to the function of the auditor and the controller. We cannot escape wartime arithmetic. But arithmetic, as practiced in industrial accounting offices, has one unfortunate characteristic: It has a bad habit of looking backwards. This is inevitable because true figures cannot be arrived at until events have passed. But postwar planning deals not with past events but with futures.

What Is Excess Capacity?

The danger of letting accounting arithmetic enter into postwar planning lies in the fact that many company executives, knowing costs and performance figures on their old plants and being thoroughly familiar with accounting procedures with respect to them, are inclined to fall into the very human error of regarding the *last plant built* as the probable postwar excess plant capacity. It is so easy to regard the old, the tried, and the proved as that which is desirable and established, and consider that which is new, experimental, and financed by somebody else, as questionable. From a performance standpoint, this point of view is ridiculous. From a production standpoint, the *last plant built* is the one with the best layout and the finest and newest equipment!

Therefore—provided transportation, labor, market, and other considerations are equal—it is the *new* building and the *new* equipment that we shall need in the postwar years. It will be the old plants and the old equipment that in the postwar years are most likely to be reckoned as excess plant capacity.

Separate Records Essential

This brings up a point that it is very necessary for auditors and controllers, as well as general officers, to consider seriously. Separate records should be kept as to the initial costs of facilities successively acquired during this war production period—for these costs inevitably enter into postwar decisions as to which facilities are to be retained and which are to be considered excess plant capacity and disposed of if possible. Likewise, separate records of cost performance should be kept as an aid to proper decisions in the highly competitive postwar period.

This should be done regardless of whether new facilities are owned by the government, financed through RFC loans, or bought by companies themselves from their own funds or from the proceeds of bank loans.

Each new expansion should be recorded in a separate ledger—so that when the war is over a company will have an individual record of just what was represented by that expansion, and what it cost. This is particularly necessary in the case of old plants to which have been added new buildings and new equipment. From an accounting standpoint, it is vital to keep the old separate from the new, even though from the purely physical standpoint they may be intermingled.

When the war is over, many concerns today operating either DPC facilities or facilities purchased under an Emergency Plant Facilities contract will be faced with the necessity of making a decision as to whether or not they wish to purchase the new facilities thus financed.

Certainly, in order to make this decision intelligently, they must know exactly what facilities were purchased under war financing and what were not. This will be necessary even though a machine tool bought under an Emergency Plant Facilities contract may stand side by side with the machine tool owned by the company long before the war began. This segregation of facilities is essential from an accounting standpoint.

A value must be placed upon properties for many considerations — for taxes, for depreciation, for amortization, for offer for sale or purchase. Consider from an accounting standpoint how vital valuations will be in the postwar period.

Depreciation Problems

Suppose, when that time comes, there must be included in the price of the product a certain depreciation item which represents facilities still standing on the books at a certain value. But suppose a competitor does not have to include in his price any such item, because his facilities have been practically written off and have little, or no, book value.

Of course, experience has time and again shown it to be true that any manufacturer who disregards in his sales price an allowance for replacement of equipment, and thereby undersells his competitor, is in the long run digging his own grave. But in the sudden competitive struggle that may follow the postwar period there will be many graves to be dug.

Here is a peculiar possibility. Suppose the latest addition to a plant was

made under a DPC contract. And suppose that between excess profits taxes on the one hand and renegotiation on the other, the company has not succeeded in accumulating during the war sufficient cash with which to purchase this plant under the terms of the option in its government contract.

Suppose, therefore, that this company saw this very latest addition to its plant sold to a competitor—and sold at a price considerably less than that stipulated in its government contract! That is certainly something to think about.

But now think about the other side of the case. Suppose this plant actually represented, under postwar conditions, excess plant capacity — and the company's competitor, misjudging the situation, over-extended himself to buy this plant—thereby loading himself up with the very plant capacity which, as it turned out, the first company was very glad to get rid of.

Which side of the fence should one be on? It all depends.

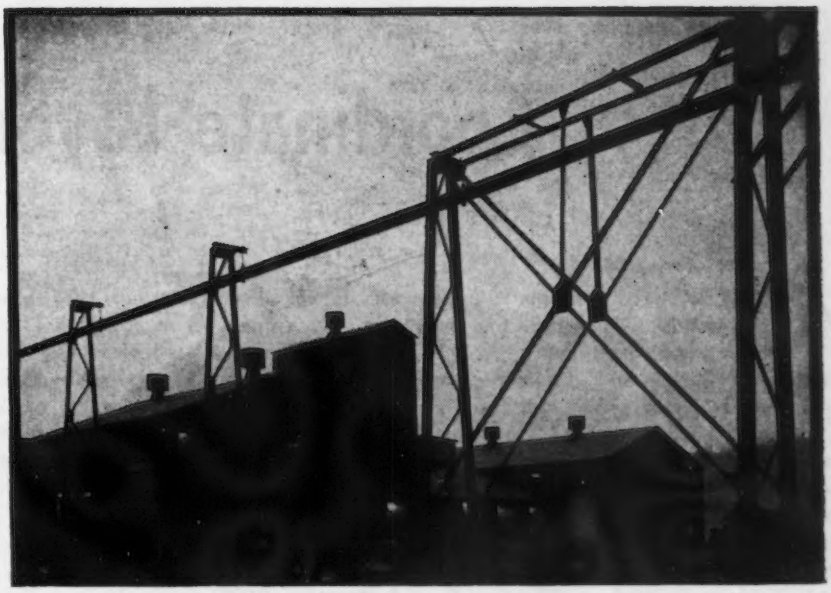
Five Year Write-Off Misleading

Now let us for a moment think of the manufacturer who has financed his own expansions but is, as he believes, being permitted a five-year amortization under an Emergency Facilities Contract. Of course—contrary to many manufacturers' assumptions and general public belief—no such five-year amortization is actually permitted.

The law has specified that in the price he charges for products manufactured by facilities covered under an Emergency Facilities Contract, a war contractor may not include any charge with respect to these facilities beyond the normal depreciation allowed for similar facilities.

In short, the manufacturer may include depreciation in his price, but not amortization. The five-year amortization which he is allowed does not apply to price. It applies only to taxes. The manufacturer is allowed to deduct from his taxable income, over a five-year period, one-fifth of the cost of these facilities. Therefore, he saves each year that proportion of his cost which is represented by the reduction in his taxes for that year. And that is all he recovers.

Let us take an example in kindergarten arithmetic: Facilities financed by a company under an Emergency Facilities Contract cost, let us say, $100. The general impression is that this $100 can be amortized over five years. But, under the law, the manufacturer cannot add one-fifth of the amount — $20 a year — in the sales



price of the product manufactured by these facilities. He can, however, for tax purposes deduct from his taxable income each year one-fifth of the cost of these facilities, that is, $20.

Let us assume that his overall tax rate is 60 per cent. In that case, by deducting $20 a year from his net taxable income, he saves $12. This $12 is all he gets back out of the $20.

If the same tax rate applied for the entire five-year period, he would have returned to him, through "amortization," only $60 out of the $100 he had invested, excluding, for simplicity, normal depreciation charges.

Two Sets of Books Needed

In any event, it would seem today that the prudent manufacturer should literally keep two sets of books with respect to wartime facilities purchased by his own company. One set of books would record these facilities on an amortized basis, and the other upon a realized amortization basis.

For example — if a corporation purchased facilities for $200,000 and through amortization wrote off $40,000 per year, the books kept for income tax purposes at the end of the first year would show a remaining value of $160,000.

However, if the manufacturer's overall tax rate were 60 per cent, he would realize a return on his capital investment of that year of only $24,000. The remaining $16,000 would then remain on the books kept for the company for that year.

If the same tax rate applied for five years, the facilities in question, for Federal Income Tax purposes, would be written off entirely. But for future depreciation in the operation of this plant, and for inclusion in its costs upon which to base selling prices, there would remain $80,000 of cost yet to be recovered for that plant's stockholders.

This one particular point, only one of hundreds involved in this situation, is an example of the financial questions which may perplex us in the transition from war to peace.

Another important point has to do with the valuation set by state and local tax authorities as to the tax basis of such plants and facilities as may have no remaining cost upon their books for future depreciation after the emergency ends.

A manufacturer will want to retain new and modern facilities. He will want to dispose of old facilities, even though he may still own them. How is he to persuade the tax authorities that these old facilities, which before the war possessed in the statements shown to his own stockholders a certain value, no longer possess such value now that the war is over?

All of this leads right back again to the necessity of carefully keeping separate records with respect to successive additions of plant and equipment during this war effort.

In conclusion, it should be added that it is not only the city and state tax authorities with whom questions of valuation and the like may be debated. First and foremost there is always to be considered the representative of the United States Treasury. What will be the attitude of the Federal Government toward these matters when the war ends?

We don't know. But there is one thing which we can definitely do today. We can have ready for postwar contingencies a financial story just as full and complete as is our production story. Remember, our production story, once the war is over, will be a matter of record. Our financial story will remain to be reckoned with.

. . . Coordinate Layout Calculations

A MASTER precision instrument of undoubted value to the metal working industry is the jig borer. Where end measures are used to establish table and saddle movement, the instruments are graduated in ten thousandths of an inch and where carefully ground lead screws[1] are employed the graduations on the dials are to similar accuracy. Thus the jig borer can be set to a given dimension with remarkable exactness.

Since the platen or table can be moved only in two directions at right angles to each other, the dimensions on the drawing should be given accordingly. Otherwise, the operator may be required to compute them himself. Such operator computations are liable to serious errors, mostly because the vicinity of the jig borer is not at all suitable for such work. These calculations can best be made in the engineering or drafting departments, using the knowledge and facilities there available.[2]

[1] *Moore, J. R., "Grinding Lead Screws Accurate to 0.0002 In. in 16 In.,"* THE IRON AGE, *June 1, pp. 42-46 and June 8, pp. 66-70.*

[2] *Hoagland, F. O., "Jig Boring at Full Capacity," The Tool Engineer, March, 1944, pp. 71-75.*

For finding dimensions for the drawing that compare in accuracy with that of the measuring features built into the jig borer, use is made of methods and formulas that are exact or whose errors are known to be negligible. Such formulas, for a right triangle, include the arithmetical relations whereby the square of the hypothenuse equals the sum of the squares of the other two sides; and the trigonometrical relations using the sine and cosine of the angle. The

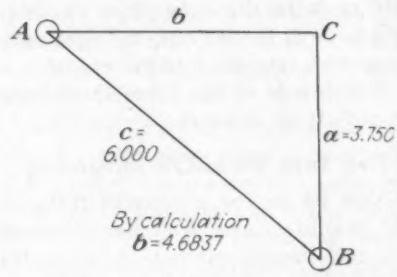


FIG. 1—Two methods may be used to solve for dimension *b* when *a* and *c* are given.

o o o

sine and cosine laws, $a:b:c = \sin A : \sin B : \sin C$ and $2bc \cos A = b^2 + c^2 - a^2$, applicable to both the right and oblique angled triangle, may be needed when only the three sides are given.

Solving these problems by trigonometric functions is to be preferred over the method involving squares, although both methods are approximate. However, the errors are negligible if logarithm tables of sufficient places are used. Five place tables are unsatisfactory, since they require interpolations for fractions of a minute of arc. Six place tables are convenient and of course give better interpolations, but for general use it will be found that seven place tables, such as Bruhns', meet all requirements. The logarithms of the trigonometric functions are given for each second to 6 deg. and for each 10 sec. thereafter. Differences are not required, except for close calculating or when the first significant figure of a number is less than 3.

The manner of using the two methods is best shown by examples. A

Calculations for Spacing 13 Holes in a 4 in. Circle

Half Angles, θ			
Deg.	Min.	Sec.	
13	50	46	2/13
27	41	32	4/13
41	32	18	6/13
55	23	4	8/13
69	13	50	10/13
83	4	36	12/13

2 × LOG COS (cos²θ)
$\bar{1}$.9743864
$\bar{1}$.8943340
$\bar{1}$.7483958
$\bar{1}$.5087956
$\bar{1}$.0994894
2.1622384

For simplicity the decimal point and the negative one index have been omitted from the log sin and log cos of the angle θ. For columns A and B the calculations are carried down for corresponding angles. The *v* numbers are transferred directly to the drawing. For the horizontal coordinates in Fig. 3, right and left of center, the calculated *h* numbers are successively added to and subtracted from the maximum *h* number, 1.98540.

The group immediately above this note, labeled 2 × log cos is for use in the check formula,

$$\sin^2\theta + \cos^2\theta = 1$$

Col. A LOG SIN	Col. B LOG COS
3789713 →	9871932
6671944	9471670
8215941	8741979
9153913	7543978
9708191	5497447
9968219	0811192

2 × LOG SIN (sin²θ)	LOG SIN + LOG COS (sin θ cos θ)
$\bar{2}$.7579426	$\bar{1}$.3661645
$\bar{1}$.3343888	$\bar{1}$.6143614
$\bar{1}$.6431882	$\bar{1}$.6957920
$\bar{1}$.8307826	$\bar{1}$.6697891
$\bar{1}$.9416382	$\bar{1}$.5205538
$\bar{1}$.9936438	$\bar{1}$.0779411

+ LOG 4 = 0.602060 (d sin²θ)	+ LOG 4 = 0.602060 (d sin θ cos θ)
$\bar{1}$.3600026	$\bar{1}$.9682245
$\bar{1}$.9364488	.2164214
.2452482	.2978520
.4328426	.2718491
.5436982	.1226138
.5957038	$\bar{1}$.6800011

v Numbers ($v = d \sin^2\theta$)	*h* Numbers ($h = d \sin\theta \cos\theta$)
.22909	0.92945
.86387	1.64597
1.7589	1.98540 (Max.)
2.7092	1.87000
3.4970	1.32620
3.9419	0.47863

1.98540 + *h*	1.98540 − *h*
2.91485	1.0560
3.63137	.33943
3.97080	.0
3.85540	.11540
3.31160	.65920
2.46403	1.50677

For Jig Borer Work . . .

By STEPHEN E. WOODBURY
Electrical Engineer,
Reid Brothers Co., Inc.,
Beverly, Mass.

. . . After noting the inherent precision of the jig borer, the author gives methods and formulas for calculating with comparable accuracy the dimensions needed for the drawing. Using seven place logarithms, examples are solved for holes arranged in a triangle and in a circle, taking the difficult case involving a prime number of holes. Several checks are given.

simple case is that given in Fig. 1, where the center to center distance of the holes is 6 in. along the diagonal and the displacement is 3.75 in. To bore the holes in the jig borer, it is necessary to have the length of the remaining side of the triangle. The two methods are compared below:

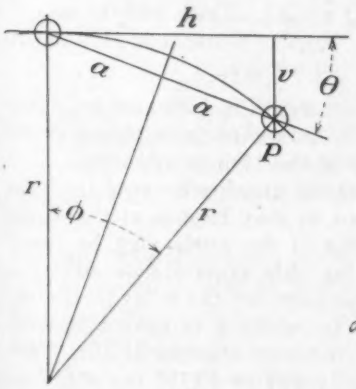
1. Solution by right triangle:

$a^2 + b^2 = c^2$, therefore $\sqrt{c^2 - a^2} = b$

log 6.000 = 0.778151
2 × 0.778151 = 1.556302
number corresponding is 36.000

log 3.75 = 0.574031
2 × 0.574031 = 1.148062
number corresponding is 14.063

subtracting squares 21.937



$\frac{\phi}{2} = \theta = \frac{360}{2n}$, where
n = number of holes
$v = 2a \sin\theta$
$h = 2a \cos\theta$
$a = r \sin\theta$
Combining
$v = 2r \sin\theta \sin\theta$
$h = 2r \sin\theta \cos\theta$
$2r = d$ = diameter
$\therefore v = d \sin^2\theta$
and $h = d \sin\theta \cos\theta$

log 21.9370 = 1.341178
1.341178 ÷ 2 = 0.670589
number corresponding is 4.6837 (Ans.)

2. By trigonometry:

$\frac{a}{c} = \sin A$, or $c \cos A = b$

log 3.75 = 0.574031
log 6.00 = 0.778151

(subtracting) $\bar{1}.795880$
which is the log sin of the angle A.

Opposite this in the logarithm table will be found the
log cos = $\bar{1}.892438$
log 6.00 = 0.778151

(adding) 0.670589
number corresponding is 4.6837, as before.

Note that the solution is found without actually determining the value of the angle at A.

The first method may be checked by substituting the answer, 4.6837, for b in equation No. 1 and solving for a, which should give 3.750 as an answer, thus:

$$a = \sqrt{c^2 - b^2}$$

The second method may be checked similarly. There is also another check when the work is partly done, using the following equation:

$$\text{Sin}^2 A + \cos^2 A = 1$$

Where A is the angle formed between sides b and c, Fig. 1.

For the example given, using the logarithms of the functions, the solution is:

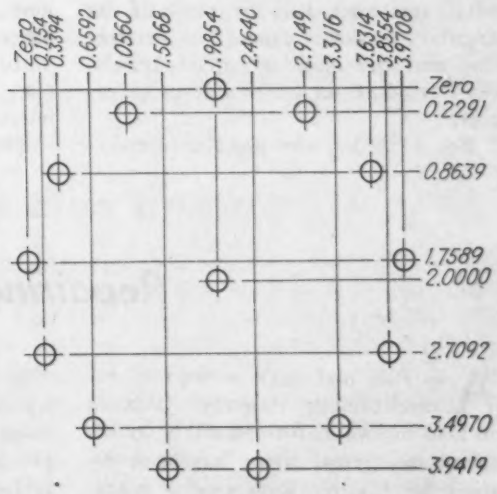
Logs squared	Corresponding number
2 × $\bar{1}.795880$ = $\bar{1}.591760$	0.3906
2 × $\bar{1}.892438$ = $\bar{1}.784876$	0.6094
(adding)	1.0000

Q. E. D.

Both methods necessarily use logarithms. But, whereas the first uses the logarithm table six times, the second uses it only three times. This means a saving of work and less chance for errors. The methods may be used to locate additional holes in triangular positions relative to each other or to holes already located. If many such locations are made in succession care must be taken not to accumulate an error too great to be tolerated.

LEFT
FIG. 2—Translation of chordal distance and angular displacement between two holes into coordinate dimensions suitable for jig borer layout.

RIGHT
FIG. 3—Layout drawing for 13 holes arranged in a circle, ready for the jig borer.



Spacing Holes in Circle

A common use for the jig borer is the locating of holes in a circle of given diameter. This can be done on

the rotary table very easily, especially if there are only a few holes whose number is not prime and when utmost accuracy is not required. While prime numbers of holes give awkward fractions for the amount to turn the jig borer table, tabular data[3] eliminate the need for calculating the angular setting from O for each division number when locating holes by polar coordinates.

[3] *Angular Circle Indexing Calculations, published by the Pratt & Whitney Division, Niles-Bement-Pond Co., West Hartford, Conn., price* $10.

Methods have been published also for locating holes equally spaced on a circle using rectangular coordinates when a rotary table is not available, but the examples are worked out for prime numbers of holes only. Although handbooks give tables of chords for any number of divisions of a circle such values are of no direct use in a coordinate system of layout. Using the method given below, however, it is possible to calculate the vertical and horizontal coordinates accurately enough for locating any reasonable number of holes on the jig borer.

As an example, let it be required to locate 13 holes in a 4 in. dia. circle. Referring first to Fig. 2 it is found that the vertical distance v as shown on the drawing is equal to $d \sin^2 \Theta$, where d is the diameter of the circle and Θ is one-half the angle at the center for the given point P. The horizontal distance h is equal to $d \sin \Theta \cos \Theta$. Since P is any point, the vertical and horizontal distances for all the holes can be found either successively or independently. The method locates each hole by one-half its angular distance from the vertical line and the diameter of the circle, thus avoiding an accumulation of errors.

For 13 holes, the angular division 32-4/13 sec. Half of this angle is 13 deg. 50 min. 46-2/13 sec. which is 13 deg. 50 min. 46 2/13 sec. which is the value of Θ to use for the first hole from the initial one. Adding this value to itself successively gives values for the other holes as shown in the accompanying table under the heading, "Half Angles." An obvious check of this table is made by adding to the last angle one-half of the first angle, which gives exactly 90 deg. for the next successive angle. The table is sufficient for locating all of the holes on one side of the circle; the holes on the other side are located by symmetry.

Using these angular values, the log sin and log cos are taken simultaneously from the seven place table of logarithms. The slide rule can be used to reduce the fractions to decimals, and for finding the proportional parts. The log sin values are then doubled to obtain the logarithm of the v factor, and the log sin is added to the log cos to obtain the logarithm of the h factor. If desired the check using the equation $\sin^2 \Theta + \cos^2 \Theta = 1$ may be used here. The calculations are completed by adding log 4 = 0.6020600, and finding the corresponding v and h numbers as given in the table.

The calculated v dimensions are transferred directly to the drawing. The h dimensions on the drawing are obtained when the calculated h numbers are added to and subtracted from 1.98540, the greatest h number. Fig. 3 shows the drawing with all dimensions ready for the jig borer.

The zero lines for the drawing may be set before the work is started. For an even number of holes, one zero line may pass through one hole and the other through two. If there is a multiple of four holes, each zero line can, if desired, pass through two holes.

There is no check for the v and h dimensions. However, there is a check just before finding the v and h numbers. It uses the relation tan

$$\Theta = \frac{\sin \Theta}{\cos \Theta} = \frac{d \sin \Theta \sin \Theta}{d \sin \Theta \cos \Theta}.$$

The logarithms of these have already been tabulated under the subheadings $d \sin^2 \Theta$ and $d \sin \Theta \cos \Theta$. If correct they will give the same value for the angle. For example, $\bar{1}.3600026 - \bar{1}.9682245 = \bar{1}.3917781$, which is the log tan of the required angle. By means of the logarithm table this is found to be 13 deg. 50 min. 46 sec., a sufficiently close check.

Of course it will be required to inspect the holes after they have been bored. This can be done with test plugs and a micrometer. The chordal distance between the holes is given by doubling the fourth equation in Fig. 2, namely $2a = 2r \sin \Theta = d \sin \Theta$. For 13 holes in a circle 4 in. in diameter, this equation is worked out by logs as follows:

$$\begin{aligned} \log 4 &= 0.6030600 \\ \log \sin \Theta &= \bar{1}.3789713 \\ &\overline{\qquad\qquad} \\ &\bar{1}.9820313 \end{aligned}$$

(13 deg. 50 min. 46-2/13 sec.) number corresponding is 0.959470 or 0.9595 in.

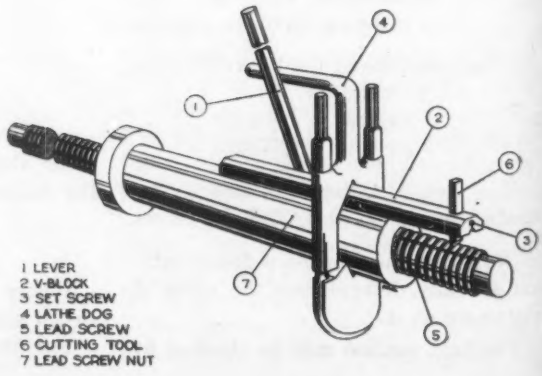
An error will be indicated by a perceptible difference from this distance in any of the 13 measurements.

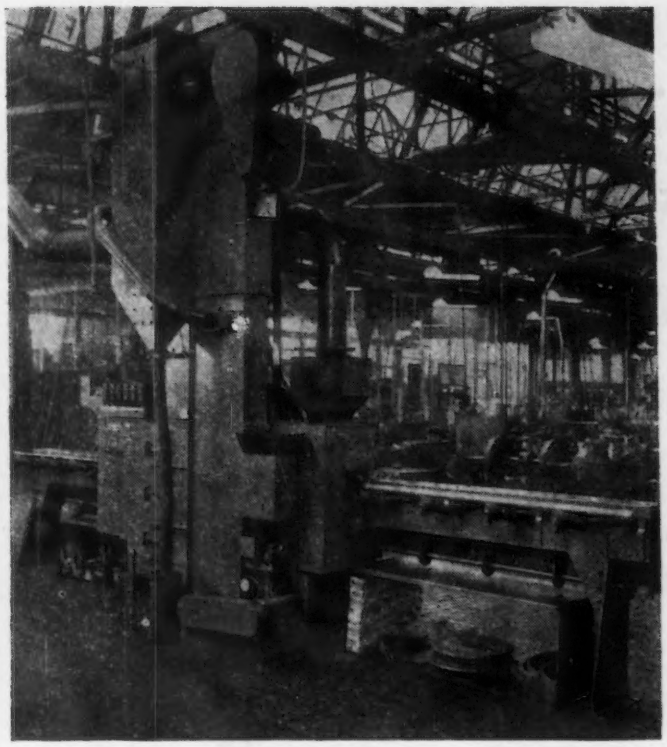
When the distance between the holes is given, as may happen at times, the diameter of the circle may be found by using this same simple equation. For instance, let the holes in the example be required to have a chordal center-to-center distance of 1 in. Then the circle will be 4.1786 in. in diameter. This is the value to use for finding the coordinate dimensions for the jig borer drawing, as already explained in full for a 4 in. diameter circle.

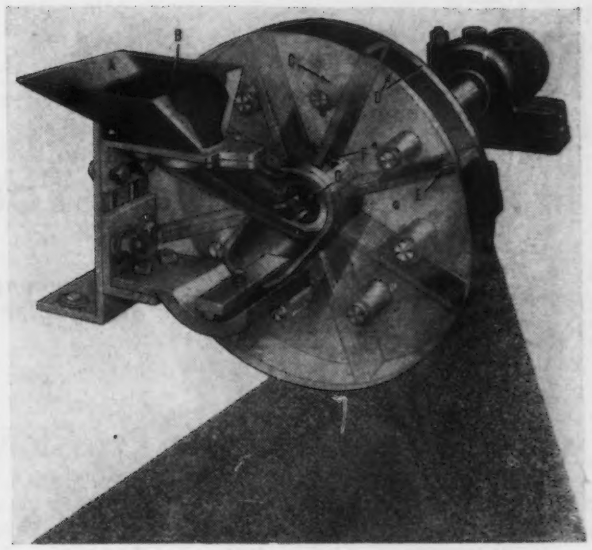
Repairing Machine Lead Screws

A QUICK and easy method of reconditioning damaged threads on lead screws, deformed either by accident or normal wear, has been devised by Clifton Roberson, a maintenance man at General Electric's Erie Works. In this method a lathe dog (4) clamps a V-block (2) machined to hold a cutting tool (6) to the lead screw nut (7). In effect the nut becomes a die with a single point cutting tool when a tool bit, ground to fit the thread, is inserted in the V-block and locked with a setscrew. The tool will clean burrs and bumps preceding the nut, which is held stationary by a long lever (1), while the screw (5) is driven by a lathe.

The method of repair, illustrated, can sometimes be performed without disassembling the screw.







ABOVE

FIG. 2—This mechanical unit (Wheelabrator) utilizing centrifugal force hurls shot upon work.

AT LEFT

FIG. 1—Complete Wheelapeening machine and conveyor to shot peen torsion bars.

Production Machines for Shot Peening

A LINE of machines for shot peening, known as Wheelapeening equipment has been announced by American Foundry Equipment Co., 555 South Byrkit St., Mishawaka, Ind.

In the Wheelapeening machines, a rain of metallic shot is directed at high velocity against such parts as gears, spring, axles, milling cutters, etc. Each shot striking the surface makes a tiny dent or pit, so that the cumulative effect is to stretch the surface layers by cold working, thus putting them in a state of residual compression. Since fatigue failure occurs under tension stresses, never under compression stresses, fatigue cracks do not get a chance to start.

With the Wheelapeening machine illustrated (Fig. 1), torsion bars (which take the place of conventional springs in tanks, buses and trucks) are placed on skewed dished rollers which convey the bars through the machine and impart a rotary motion so that all surfaces of the bar are exposed to peening action. Inside the machine a Wheelabrator unit hurls a rain of shot at high velocity onto the surfaces of the torsion bar. Other models of Wheelapeening machines are available to give different combinations of motion for peening parts of various shapes and sizes.

The Wheelabrator, Fig. 2, is a mechanical unit that utilizes controlled centrifugal force instead of compressed air for throwing shot upon the work. Shot is fed to the center of the bladed wheel from an overhead storage hopper whereupon it is hurled by centrifugal force upon the work to be peened. An impeller G rotates with the wheel proper and carries the shot to an opening in the stationary control cage F where it discharges to the bladed section of the wheel. At this point the shot is picked up by the inner ends of the throwing blades D and is gradually accelerated in its passage to the periphery of the wheel. The final throwing velocity is the result of radial and tangential forces. Change in direction of the blast stream is obtained by turning the control cage which changes the position of the opening.

Provision is made in Wheelapeening equipment for the continuous reuse of shot, for the removal of broken shot and dust, and for the addition of new shot to the cycling system.

High Quality Bronzes

A NEW process for producing bronzes of greatly increased strength and toughness which does not involve the purchase of new or special equipment has been announced by Dr. W. T. Pell-Walpole and Dr. V. Kondic in the *Journal of the Institute of Metals*, Vol. 70, 1944, 127-147 and 275-289. The development of a flux degassing process which enables tin bronzes and phosphor bronze to be produced successfully from ordinary commercial grades of metal, or from scrap, is described.

This is achieved by using a simple flux containing borax, sand and copper oxide. Bronzes containing 10 per cent tin, suitably cast, can be extruded and subsequently cold rolled and cold drawn. For example, a 10 per cent tin phosphor bronze gave 24 to 28 tons per sq. in. tensile and 10 to 20 per cent elongation in 2 in. The specification of the comparable commercial alloy calls for only 16 tons tensile and 1½ to pct. elongation.

Bronzes with 10 to 14 per cent tin, when made by the new method, can be hot or cold rolled, and the wrought products are said to have exceptional mechanical properties. A 10 per cent tin bronze, extruded and cold rolled, gave 75 tons tensile and 18 per cent extension.

New Equipment . . .

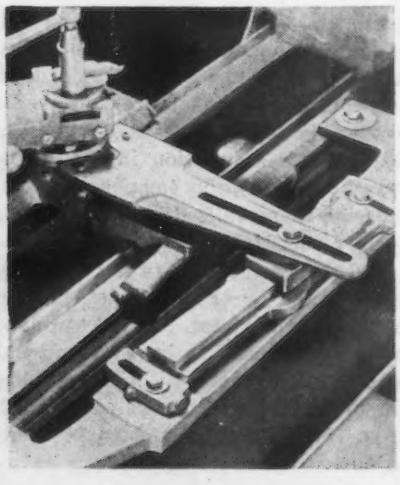
Small Tools and Gages

. . . Recent developments in cutting tools, chucks, holding fixtures and gaging and marking devices are described in the following pages.

A NEW type of cutting tool alloy has been announced by *Jessop Steel Co.*, Washington, Pa. Made of a cast non-ferrous alloy consisting principally of chromium, tungsten and cobalt, the tool has a hardness range from 60 to 62 Rockwell C and bridges the gap between high speed and cemented carbide cutting tools. The tool is cast to shape and is used in the as-cast condition. Exceptionally high red hardness is claimed for the tool inasmuch as only one point drop in Rockwell C is noted at temperatures ranging as high as 1900 deg. F. It is said that peak efficiency is realized when cutting at speeds from 20 to 80 per cent over the top speeds for high speed tools. Intermittent cuttings even of chilled castings is possible. The alloy cannot be hot worked and is not susceptible to heat treatment. Both plates and squares for tool holder bits or for milling cutter inserts, surface ground to tolerance of 0.000 and 0.005 in., round sections centerless ground to the same tolerances, and die inserts or other complicated sections, furnished in the as-cast condition, are available.

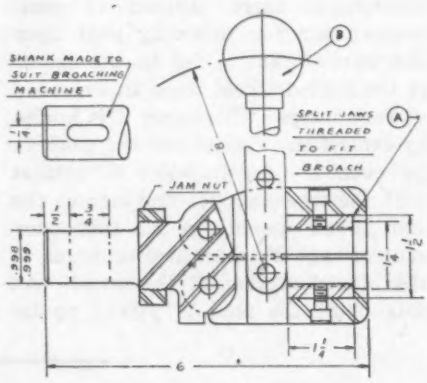
Taper Attachment

A TAPER attachment for taper turning, boring, threading, etc., has been announced by *Master Taper Co.*, 126 North Clinton Street, Chicago 6. The attachment can be used in any position on a lathe and will not interfere with straight turning. The sliding fixture has straight gibs. Graduations are in inches at one end of the swivel bar and in degrees at the other end. It tapers up to 3½ in. per ft., 16½ deg. maximum in either direction, 7½ in. in length at one setting. It can be fitted to each of the following lathes: Logan 10 in., Atlas 10 in., South Bend 9 in., Sheldon and Clausing. Taper attachment for other lathes are manufactured to order.



Broach Holder

A BROACH holder, which is said to increase the speed of broaching operations has been announced by *Zagar Tool, Inc.*, 23880 Lakeland



Blvd., Cleveland 17. The holder has removable threaded pads (A) which are furnished in any standard pitch from 3/16 to 1 in. The holder is self-centering and can be adapted to fit any make broaching machine. The holders can also be furnished to hold grooved or slotted broaches. The only additional parts necessary are suitable pads.

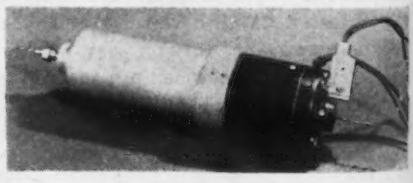
Curved Tooth File

A MILLED curved tooth file, the Nicholson Super - Shear file, which combines fast stock removal and smooth finishing in one operation, has been developed by *Nicholson File Co.*, Providence. The arcs of the shear are off center in relation to the axis

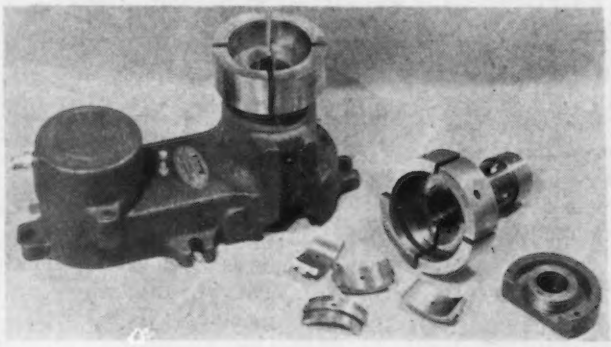
which permits the teeth to begin with wide gullets and a right angle for fast cutting. These teeth become shorter in height and closer together as they terminate in a long shearing angle for producing the shearing effect. Consequently when a surface is filed with a shearing stroke in an ordinary right toward left working direction, the shear is said to smooth out its tracks as it goes and serves as practically two shears in one. Longitudinal serrations break up the filings and assist the file to clear itself of chips. These serrations also serve to overcome chatter and the tendency of a file to run off the line of work. The file is made in lengths of 8, 10, 12 and 14 in.

Automatic Drilling Unit

AVAILABLE in three models ranging from No. 80 up to ⅜ in. diameter drill capacity, a single purpose automatic drilling unit has been announced by *Simplex Engineering Co.*, Detroit 27. The units are completely self-contained and can be mounted at any angle or plane and operated automatically by electrical circuits. The mounting of a number



of these units in a special machine is claimed to insure rapid drilling, reaming, etc., of parts where high production is required.



Collet Air Chuck

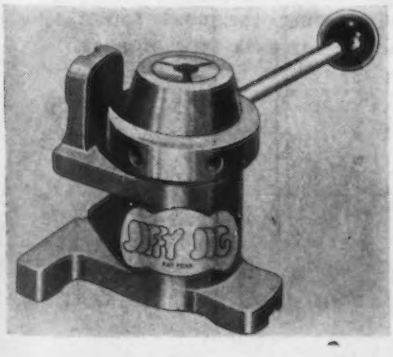
AN improvement in their No. 2 special collet air chuck has been announced by *Redmer Air Devices Corp.*, 601 W. Washington Boulevard, Chicago 6. By the use of an adaptor, a master collet and pads can now be used giving a capacity up to 4 in. The changeover from the standard No. 2 special chuck requires only removal of the stop rod and insertion of the adaptor block. The master collet screws on to this base block holding the collet stationary which eliminates any possibility of depth and center variances.

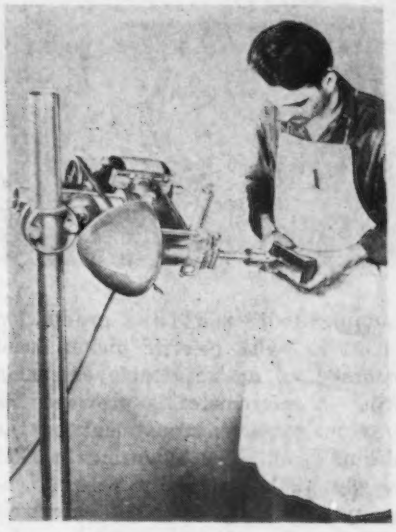
Internal Expanding Collets

INTERNAL expanding collets for any make of screw machine, lathe or collet application has been announced by *Zagar Tool, Inc.*, 23880 Lakeland Blvd., Cleveland 17. The collets can be furnished to hold internally threaded parts, eliminating the necessity of screwing parts on and off threaded arbors. Features of the instrument include fast operating method of internal chucking, large area of spring action, tight holding power and inability of collet to be sprung beyond specified size.

Lever Operated Chuck

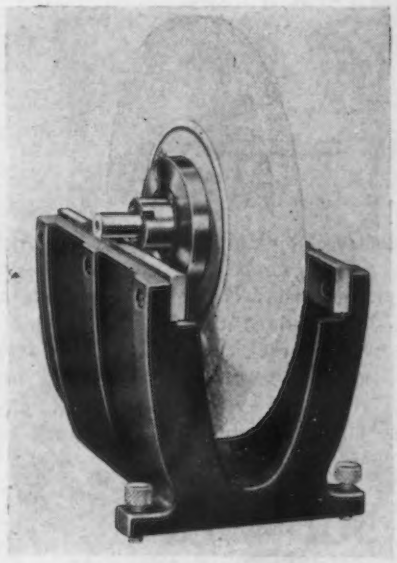
A LEVER operated chuck, the "Jiffy Jig" J-10, with a capacity for stock ranging from 1/16 to 1 in. cross section has been announced by *Monarch Governor Co.*, 1832 West Bethune, Detroit. The unit can be set up either horizontally or vertically. When the chuck is either open or closed, the collet has zero axial movement and positive axial dimension control. The chuck consists of a cap, a base and an operating lever, the taper on the cap conforming to that of the collet. With the proper sized collet in place, the cap is screwed down on the base until the collet opens and closes as desired. The operating lever is then screwed into place and the chuck is ready for use. It can also be used together with an automatic spring ejector and Warner Swasey No. 2 collets may be substituted whenever No. 2 (standard) Jiffy Jig collets are not available.





Angle Bracket

AN angle bracket that will convert any drill press into an all-purpose machine for angle drilling, polishing, buffing, sanding, rotary filing, wire brushing, tapping, reaming, burring, grinding, honing, etc., has been announced by *Nobur Mfg. Co.*, 910 North Orange Drive, Los Angeles. Spindle angles can be adjusted to any height, can be placed horizontally or vertically, at any angle, and can be set for greater convenience and operator comfort. The angle bracket is positive locking. A single turn of the wrench is all that is needed for positioning. It comes in sizes for drill presses, with 2¾ to 3-29/32 in. tubular columns.

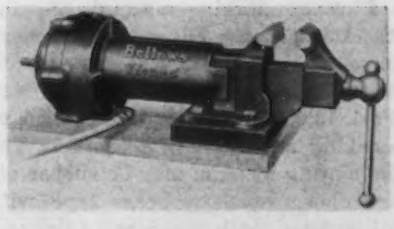


Grinding Wheel Balancing Stand

A BALANCING stand for surface grinding wheels which consists of a cast iron base on which two hardened rails are mounted has been announced by *Taft-Peirce Mfg. Co.*, Woonsocket, R. I. The balancing arbor rolls freely on these rails to indicate balance of the mounted wheel. It will accommodate surface grinding wheels up to 7 in. in diameter.

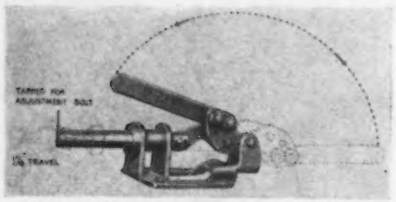
Bench Vise

AN air or hand-operated bench vise, Vispeed, has been developed by the *Bellows Co.*, Akron, Ohio. The unit consists of a standard 4 in. Reed bench vise and an 8 in. air cylinder which operates through the full range of the 6 in. jaw opening of the vise. Positive safety control limits the air-power movement of the movable jaws, adjustable from zero to a maximum of 1 in. The vise is foot controlled, leaving both hands free to handle work. Jaws lock in either position. Normal hand operation of the vise is possible at all times. Vispeed is available as a completely packaged unit or the air unit may be purchased separately for attachment to any standard 4 or 4½ in. vise.



Toggle Clamp

A "PUSH - AND - PULL" action clamp, to be known as the De-Sta-Co Model No. 605 toggle clamp has been announced by *Detroit Stamp-*



ing Co., 345 Midland Avenue, Detroit 3. The work end of the clamp (plunger rod) is tapped to receive a ⅜-18 standard threaded bolt which provides quick adjustment. Travel distance of the plunger rod is 1¼ in. By relocating one of the handle bolts the clamp is converted from push to pull action or vice-versa.

Marking Stamp

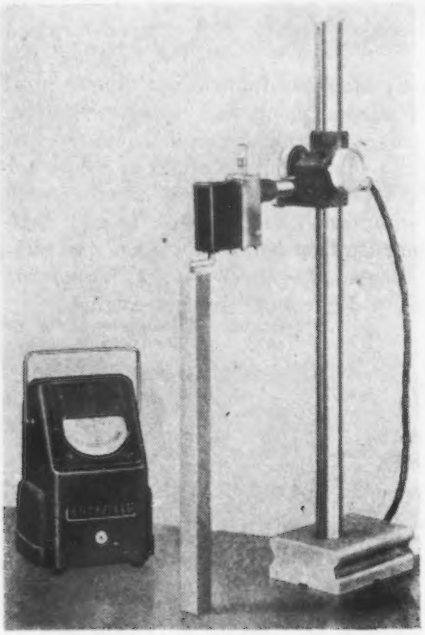
MARKING stamps for identifying producer, operator and operation have been announced by *New Method Stampings, Inc.*, 147 Jos. Campau, Detroit 7. A large initial letter is used as an "Outline" on the stamp while other pertinent information as to operator and operation performed on the part is included within that character outline. The stamps are available in a variety of sizes. The most popular sizes are 3/16 and ¼ in. Shanks are made either plain or knurled for thumb and finger gripping. The tapered and rounded head prevents peening and dangerous chipping under heavy blows.

Marking Machines

THE Markomatic No. 9, a conveyor marking machine, and the Markomatic No 10, a bench model, have been announced by *Adolf Gottscho, Inc.*, 190 Duane Street, New York 13. Markomatics are capable of marking an area 2½ x 3½ in. The imprinting medium may be rubber die or rubber, steel or brass type with ink or steel or brass type to impress an imprint into soft material such as cardboard, chip-board or wood. Standard units are designed for marking a flat surface. Special units have been supplied for marking inside tubes of diameters more than 3 in. Other units have been developed for marking around the periphery of cylinders of diameters greater than 1½ in.

Height Indicator

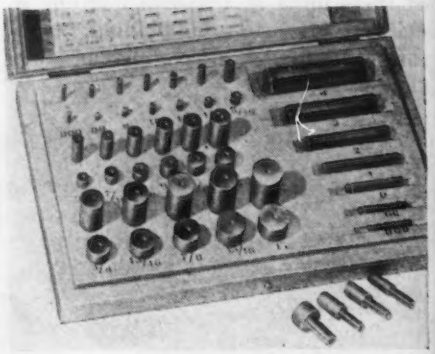
DESIGNED for use on a surface plate, a precision height indicator with Electrigage has been announced by *Sheffield Corp.*, Dayton 1. The instrument includes a surface plate block, a 26 in. column with rack and a Sheffield Electrigage, 1000:1



amplification, smallest graduation 0.0001 in. with electric pickup head mounted on an adjustable extension arm. A micrometer is provided for 3/32 in. vertical adjustment of the pickup head. The mounting bracket is adjustable vertically with a capacity of 0 to 18 in. The extension arm can be adjusted to bring the pickup head to any location with a throat capacity, gaging point to edge of column 4½ to 11 in. and gaging point to edge of base 3½ to 10 in. The pickup head can be rotated and locked in position within a full range of 360 deg. while a fine adjustment knob facilitates the coarse and fine setting up.

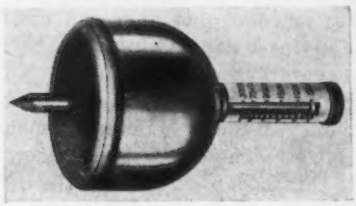
Plug Gage Blanks

AN "Atlantic Emergency Set" containing 36 cylindrical plug gage blanks in steps of 1/16 in. has been announced by *George Scherr Co.*, 200 Lafayette Street, New York 12. The set will permit the production of any size plug gage from 0.029 to 1.000 in. in just a few minutes work on a cylindrical grinding machine. Where higher standards and closer tolerances are involved, the gages are lapped after grinding.



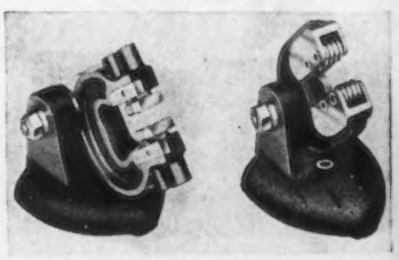
Tachometer

A TACHOMETER that can be manipulated with one hand and that weighs only 5½ oz. and has a diameter of 2¼ in. has been announced by *Standard Machinery Co.*, Providence. The range of the instrument runs from 500 to 3600 r.p.m. and the variation from absolute accuracy is said to be less than 3 per cent over the whole range. A pointed contact spindle is built into the instrument for use with shafts that are centered. An elastic tip is provided to slip over the pointed spindle for use on shaft ends that are not centered.

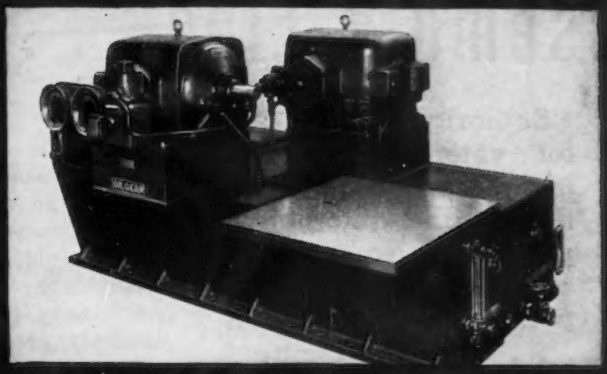


Snap Gage Holder

A TOOL-HOLDER which will accommodate any type or make of snap gage, including all AGD frames and standard adjustable thread snap styles has been announced by *Taft-Peirce Mfg. Co.*, Woonsocket, R. I. The holder may be clamped on at any angle. The principle value of the new holder is that it permits standardization on a single piece of equipment, eliminating the need for a special holder for each type of gage.



Economical Oilgear Radial Rolling Piston power units are used to charge stationary and portable catapult power plants to catapult planes at flying speeds in something over 100 feet. Besides high linear speed obtainable over a wide range, acceleration and/or deceleration are controlled, power can be stored during idle period.



FROM ZERO TO FLYING SPEED IN A MATTER OF SECONDS

ARE YOU TRYING TO:

1. Apply large forces through long . . . or short . . . strokes at variable speeds?
2. Obtain automatic work cycles, variable speeds in either direction . . . with or without preset time dwell?
3. Apply large forces through continuous or intermittent reciprocating cycles at constant or variable velocities?
4. Obtain extremely accurate control of either position or speed of a reciprocating member?
5. Apply accurately variable pressure either static or in motion?
6. Closely synchronize various motions, operations or functions?
7. Apply light . . . or heavy . . . forces at extremely high velocities through either long or short distances of travel?
8. Obtain continuous automatic reversing drives at constant R.P.M. or over a wide range of speed variation?
9. Obtain accurate remote control of speed and direction of rotation, rates of acceleration and/or deceleration?
10. Obtain constant horsepower output through all or part of a speed range?
11. Obtain automatic torque control?
12. Obtain accurately matched speed of various rotating elements?
13. Obtain constant speed output from a variable speed input?
14. Obtain full preset automatic control, elimination of problems of shock, vibration, etc.?

You Need Oilgear!

JUST ANOTHER EXAMPLE OF OILGEAR'S AMAZING ABILITY TO SOLVE THE PROBLEMS OF UNIQUE POWER TRANSMISSION

There is hardly any limit to the applicability of Oilgear Fluid Power. In catapulting heavy airplanes from the decks of carrier escorts, Oilgear not only furnishes the tremendous power required to accelerate the load from zero to flying speed in a few seconds but it accumulates this power with comparatively small, standard units while each plane is being maneuvered into position. *You* can use units of this type on other installations where tremendous power or high velocity is required intermittently, as in die casting machines, braiding and knitting machines, riveting presses, etc. Or if your machine power or transmission requirements lie far afield, they are almost certain to be met . . . better, more economically . . . in any of the scores of other functions Oilgear Fluid Power provides. Just as war industry built upon peacetime knowledge, so today shrewd designers are adopting the lessons learned in war. Put *your* problem up to Oilgear engineers; see if their solution isn't what you've been looking for. Do it *now* . . . THE OILGEAR COMPANY, 1303 West Bruce Street, Milwaukee 4, Wisconsin.

OILGEAR

Fluid Power

Assembly Line . . .

STANLEY H. BRAMS

• Seniority provisions for veterans are being discussed between unions and automotive plants . . . No crystallization is seen yet on policy to be followed . . . Chrysler contract argument begun in 1943 is finally settled.

DETROIT — Placement of war veterans in industry jobs has graduated to the active problem stage. Pure thinking a month ago (See THE IRON AGE, Oct. 12, 1944, page 92) has been transformed to discussions in several company-union bargaining contract renewal negotiations, and the pattern is being set for the rest of autodom to follow.

Thus far no uniform position has been taken by the automobile companies. The viewpoints range all the way from integrating returned vets purely on the basis of seniority, with the ex-soldier taking his place at the bottom of the seniority list, to complete abandonment of seniority where it impairs the veteran's obtaining a job.

General Motors is currently negotiating one contract proviso on the subject and will shortly face a second. Chrysler will begin almost any day to start dickering on the same issue. Ford has also proposed an agreement addition on the subject. A few smaller shops are well into negotiations.

On the one hand is the position of the CIO United Auto Workers Union. A model clause drafted by the UAW last month followed rather closely the language adopted at the Grand Rapids convention in September, varying only in minor degree. Briefly it provides that any veteran who formerly worked in a shop covered by an Auto Union contract can return to that plant within one year of service discharge with seniority totaling the time worked in the plant plus the time in uniform. Veterans not employed when they went to war—which would include those who went from high school and college classrooms to service—would obtain plant seniority credit for time spent in military service as soon as they obtained a job (within one year after military discharge). The basic problem in this arrangement, upon due contemplation, appears to be the fact that it will be practically impossible for a previously unemployed veteran to get a job if he must buck a seniority list including not only all persons who worked during the war, but all veterans who had places in plants before the war.

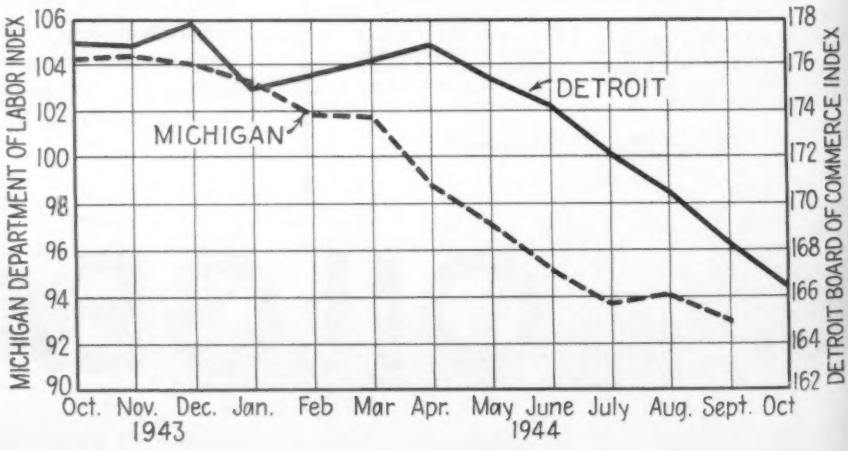
Chrysler Corp. has a rather conservative approach to the problem which is to be discussed in immediately forthcoming negotiations with the UAW. Chrysler proposes that, first, all former employes of Chrysler return to their jobs or comparable ones with full seniority for time of service, if they are physically able to handle the work. Chryslerites disabled in the war would be assigned to jobs they could handle, without regard to any seniority limitations. Veterans who were not employed by Chrysler and who entered service after May 1, 1940, when Selective Service reemployment benefits for servicement became effective, could obtain jobs with the company on the basis of seniority time equivalent to the tenure of service.

THE General Motors approach is broader. It provides: First, that disabled vets may be placed on any job they can hold without regard to seniority rules; second, veterans not previously employed by General Motors could be hired and retained as desired, regardless of the seniority of other employes hired after May 1, 1940. That is to say, GM would draw a time line in 1940, beyond which seniority would not be counted. A serviceman with three months of camp behind him could replace a plant worker who went on the job three years ago.

Ford sets up superseniority, as Selective Service wishes, but qualifies it with discretionary application. Any veteran can be hired regardless of layoffs of regular employes; and in slack times the veterans may, in company discretion, be by-passed without regard to seniority rights of others. Ford gives the veterans another break in determining seniority tenure; those who entered service after Jan. 1, 1942, have seniority dating back to that date when they are hired. Others get seniority as of date of induction. Any former Ford employe who returns to work after leaving service can within 60 days obtain transfer to any plant in the United States with full seniority.

In between these various positions

EMPLOYMENT PEAK PASSED: *As graphically indicated above, payrolls in Detroit and Michigan, the heart of the armament effort, are well beyond their peak totals. The solid lines show the Detroit Board of Commerce index, which reached its high of 177.9 in December, 1943. The dotted lines show the Michigan Department of Labor index, which stood at its high of 104.4 in November, 1943.*



"Orchids" from an Exacting Customer

Following is excerpt from an unsolicited letter from a prominent airplane engine manufacturer:

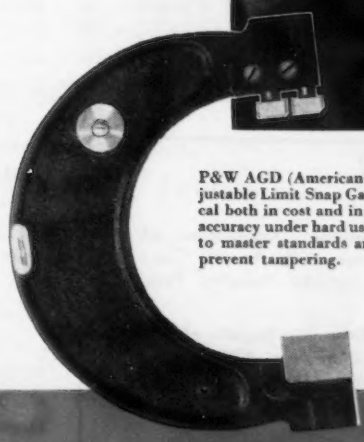
"Subject gages are definitely the best quality in precision workmanship of any of this type received to date. The precision-lapped finish of gaging jaws and center block details is exceptional, and is comparable to gage size blocks for quality of finish and tenacity in wringing. The error in parallelism of center block is negligible.

"Trusting that we may continue to receive products of such high quality from your company."

. . . for P&W Snap Gage Accuracy!

It's not easy to earn praise such as the letter above. But consider — P&W Adjustable Limit Snap Gages have frames of high grade, close grained grey iron, seasoned to assure stability. The easily adjustable anvils of finest tool steel are heat-treated, lapped flat and square with shank — provide maximum bearing, longer wearing surface, unsurpassed *accuracy*. Easy to handle, even for unskilled operators, these gages provide a check for maximum and minimum diameter in one single hand motion. In every way, P&W Adjustable Limit Snap Gages are a paying investment. Circular giving full particulars will be mailed upon request.

P&W Trusform Adjustable Limit Snap Gage features lightness, great strength and rigidity. Its bakelite grip insulates gage from heat of operator's hand. It will produce the lowest cost per piece gaged on any job for which it is suitable.



P&W AGD (American Gage Design) Adjustable Limit Snap Gage is very economical both in cost and in use, will retain its accuracy under hard usage. It is easy to set to master standards and can be sealed to prevent tampering.

Ideal for the limit system wherever there are diameters or lengths to be checked, P&W Adjustable Limit Snap Gages are easily adjustable and feature positive anvil locking to guarantee unchanging accuracy.

PRATT & WHITNEY

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is plenty of latitude. Companies naturally want to be able to avail themselves of the pool of strong, disciplined young manhood which has been mechanically trained in the services. Equally naturally, these men would be of more value than many of the fringe workers who have been hired since war began. Industry does not feel that unlimited superseniority as interpreted by Selective Service, under which veterans would have job preference over everyone else, is practical or fair, but it does feel that certainly the man who went away to war should have at least an equal chance with the man who, because of physical defect or special skill, stayed home to make war tools. This is the nub of the General Motors position, and it is the ground on which most Detroit industry will likely ultimately stand. It will, however, be a hard position to establish and hold, because it is bound to affect a portion of the workers who came on payrolls since mid-1940 (including, perhaps, some World War I veterans), and because it will be contested by unions pressured by the sizable slice of present active membership likely to be adversely affected. Nevertheless, the General Motors position has been discussed at length already with the UAW, and will be introduced in negotiations for five plants with the CIO United Electrical, Radio and Machine Workers Union.

CHRYSLER'S negotiations start just about as the old contract expires on Nov. 29. The old contract, by way of observation, had an effective life of but 40 days, approval of it having been made by the National War Labor Board no more farther back than Oct. 20. This approval took the form of rejection of a union petition to review the findings of the Detroit regional WLB on the subject.

Detroit

• • • Ford Motor Co. went the auto industry one better on veterans' matters last weekend by setting up vacations with pay for them, assignable to all ex-Ford workers who return within 60 days of discharge from the services. Vacation length depends on tenure of employment, with military service counting along with time on payroll. Veterans returning between Dec. 1 and May 30 of any year will be eligible for full paid vacation during the current vacation period. Those returning between June 1 and Nov. 30 will be given half the paid vacation due that year.

This rejection was significant, because the case was studded with postwar considerations. Unnoticed in the press to date, the issues decided were broader than any treated thus far by WLB this year, and the decision will doubtless be echoed in the General Motors case, probably to be decided in December.

The NWLB did not rule on the pay raise demands made by the Union in behalf of some 75,000 Chrysler workers. But it did refuse to review determinations of the Detroit board on other matters which probably are considerably more far-reaching than a pay raise, even a pay raise which might upset the Little Steel formula.

For instance, the union request that the corporation establish a postwar security fund for its members was denied. As in the General Motors case, the UAW wanted Chrysler to set aside an indeterminate amount of money to be used to maintain jobs during changeover or reconversion or any period of unemployment following the war. Another union demand that the corporation guarantee 40 hr. of work per week was also denied in the regional decision upheld at Washington. The regional decision pointed out that the guaranteed work week and the unemployment contingency fund both involved matters becoming effective when the war ends, and therefore could not be determined by any war agency like the WLB.

A third turndown at Detroit which was upheld in Washington was the union's request that Chrysler pay insurance premiums and group hospitalization of all employes with established seniority. A fourth was a request that a mutual agreement be reached with management on pay rates for new work before operations begin.

Another was a rejected union demand for elimination of existing wage differentials between plants in Detroit and other parts of the country. In this determination the Detroit board and its approving Washington board followed a line set down by the NWLB in 1942. These precedents were set both on prior mutual agreement and the elimination of interplant inequalities.

Monsanto Develops Robomb Propellant

Dayton

• • • Plans for the manufacture of launching propellants for American-type robot bombs were announced here recently by the Monsanto Chemical Co.'s central research laboratory in a joint statement with the AAF Technical Service Command.

This announcement followed an earlier statement that Monsanto was building an $8,000,000 plant at Karnack, Texas, and the announcement by the Technical Service Command that Monsanto was one of the American companies cooperating in the production of robot-type aircraft.

Development and testing of the propellant were accomplished through cooperation of Monsanto, the National Defense Research Council and the Technical Service Command. Dr. Charles A. Thomas, head of Monsanto's central research laboratory here and formerly associated with the development of tetra-ethyl lead for motor fuel, had a leading role in directing the research.

COMING EVENTS

Nov. 27-Dec. 2—National Exposition of Power and Mechanical Engineering, New York.

Nov. 29-Dec. 1— American Society for Testing Materials and American Institute of Mining and Metallurgical Engineers, technical meeting, Philadelphia.

Nov. 30—American Society of Mechanical Engineers, Rubber Plastics Division, New York.

Dec. 1—Steel Warehouse Association, Pittsburgh.

Dec. 4-6—SAE National air cargo meeting, Chicago.

Dec. 6-8—National Association of Manufacturers, 49th Annual Congress of American Industry, New York.

Dec. 10-13—American Society of Refrigerating Engineers, 40th annual meeting, New York.

Jan. 8-12—SAE Annual Meeting, Detroit.

Jan. 10-11—Institute of Scrap Iron & Steel, Inc., annual meeting, Cincinnati.

March 19-22 — Machine and Tool Progress Exposition, American Society of Tool Engineers, Cleveland.

To Select Heat Treating Data Quickly, Accurately

Men responsible for tools will find this new Heat Treating Guide issued by The Carpenter Steel Company a great convenience and time saver for themselves and the heat treating department. This is because it gives complete information on the heat treatment of all Carpenter Matched Tool Steels in handy, easy-to-use form.

You can tell at a glance for each steel: the type analysis, forging heat, normalizing heat, annealing treatment, hardening treatment, furnace atmosphere and recommended drawing range. In addition you can determine for each Matched Tool Steel the hardness for various drawing temperatures.

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Washington

L. W. MOFFETT

• Manpower discussions center on getting certain "must" programs into desired production level... Attempt being made to shift workers into the most critical industries.

WASHINGTON—Manpower discussions these days between WPB and the War and Navy Departments are mainly concerned with getting certain programs designated as "must" into the desired production level.

With about 200,000 men needed in essential programs and about one-third of this number needed in the must programs, experts have tried to shift men into the most critical industries.

Unfortunately, a situation has arisen whereby the emphasis on one program pulls workers from another and results in lags in a number of programs which were not considered critical at one time but are now moving toward that classification rapidly.

Officials dealing with manpower are recognizing that something must be done, but at this point it is reported that there is no ready-made solution right at hand. For instance, to increase production of heavy tires, workers who were making automobile tires were shifted over to the heavy tire lines. In the last 60 days, a serious lag has developed in light tire production.

Similar conditions are developing in many programs, so that besides the headaches of labor evaporation through a desire to gain postwar security, critical programs will probably suffer in the next months because of inability to stretch the dwindling manpower supply far enough.

Not much attention has been paid to reports that much of the industrial unrest during the war has been caused by poor housing and sanitation and lack of amusements in many places throughout the country. This is the view of one department head who says that the fact that workers are making more money than ever before doesn't do much good if their living conditions are bad and there is no suitable place of amusement to go to during their leisure hours.

* * *

It is reported that ODT has requested Selective Service to defer young men who are officers on the Great Lakes ore boats. The Great Lakes have been described by many a nautical man with sea-going experience, as the trickiest bits of water in the world when there is a storm.

* * *

The Mead Committee will soon launch public hearings on surpluses. The committee which was once headed by Harry S. Truman, vice-president-elect, may soon make a reappraisal of the whole production picture. This of course will include such subjects as reconversion and manpower.

* * *

The homeward trek of many industrialists from the war agencies has the United States Chamber of Commerce concerned. The Chamber which sees a great need for managerial strength in many government agencies wishes that there was a way to get businessmen of proved executive ability interested in staying on in Washington, or to get others to come and take their turn in helping the government.

Knotty problems such as surplus property disposal, termination and labor relations are deserving of the attention of the best industry can offer. War Production has occupied the attention of many of the most gifted executives who now feel that the greatest problems are so well along toward solution that they can be spared by WPB and other agencies.

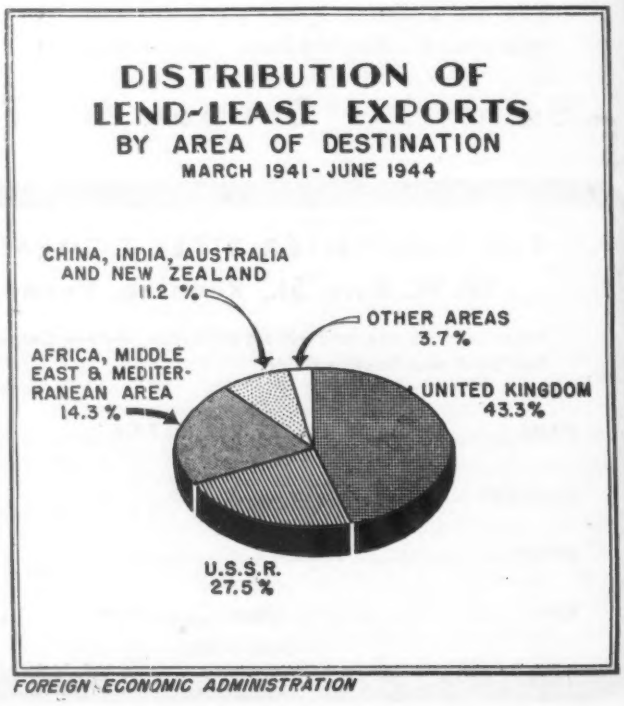
* * *

More and more evidence is showing that in the coming years, management is going to become more vocal than it has been in the past. Some businessmen say that this is one of the great defects in management's strategy in getting along with labor, that it has not frequently enough expressed itself in public.

When businessmen speak privately of their problems and their desires to improve labor relations, they frankly admit that they are aware that one of the weakest links in their policy is that they do not present a united front and do not speak in concert. While one industry may have one objective in dealing with labor, another industry has a quite different policy.

This divided policy, it is said, is one reason that industry almost always loses in labor disputes. One segment of industry is usually not powerful enough to make itself heard. While trade associations have done a great deal to unify the ideas of management, it is generally agreed that management itself has not gone a great distance down this path.

Another flaw is in failure to convince the working man that free


DISTRIBUTION OF
LEND-LEASE EXPORTS
BY AREA OF DESTINATION
MARCH 1941 - JUNE 1944
CHINA, INDIA, AUSTRALIA AND NEW ZEALAND 11.2 %
OTHER AREAS 3.7 %
AFRICA, MIDDLE EAST & MEDITERRANEAN AREA 14.3 %
UNITED KINGDOM 43.3%
U.S.S.R. 27.5 %

FOREIGN ECONOMIC ADMINISTRATION

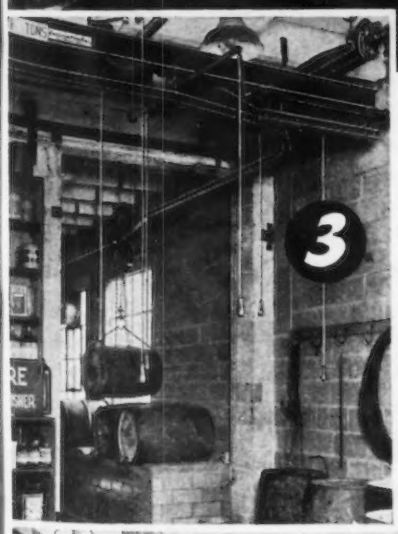
$1140.

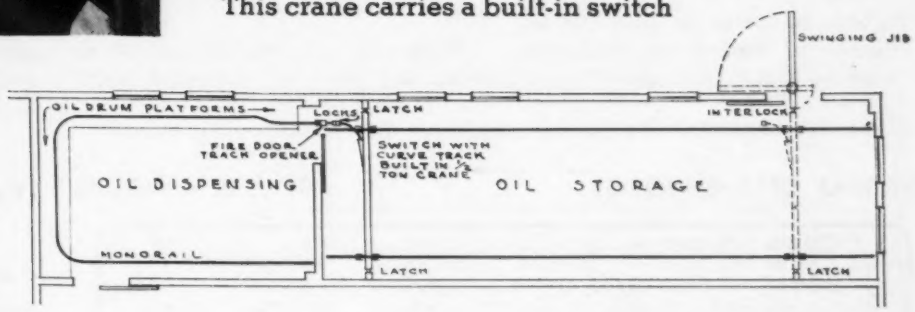
AMERICAN MONORAIL SYSTEM INSURES

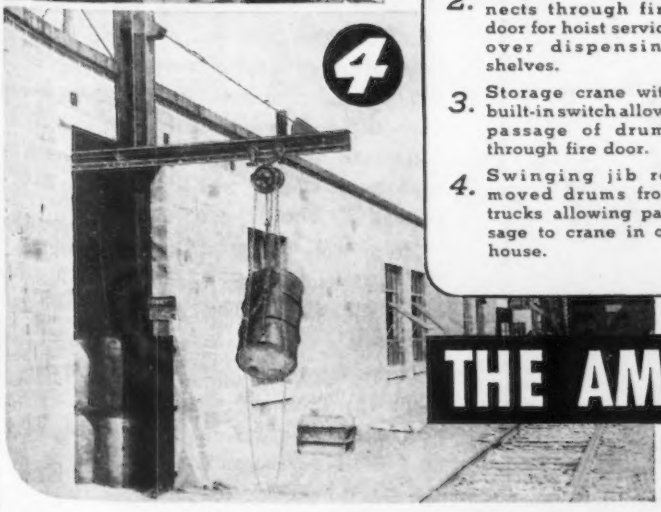
FIRE PROTECTION • LOW COST HANDLING • ORDERLY STORAGE

All handling of oil drums through storage and dispensing is done systematically at greatly reduced cost.

This installation represents only a small investment. At a cost of only $1140 the system includes a standard jib crane which interlocks with a special bridge crane inside the oil house. This crane carries a built-in switch







1. Special crane carries drums across switch to track in dispensing room.
2. Loop of track connects through fire door for hoist service over dispensing shelves.
3. Storage crane with built-in switch allows passage of drums through fire door.
4. Swinging jib removed drums from trucks allowing passage to crane in oil house.

permitting passage of hoist to a curve connecting through the fire door to the single track loop of MonoRail around the dispensing room.

Here is another example of a low price system furnishing low cost operation of American MonoRail equipment. Let an American MonoRail engineer show you the answer to your troublesome handling problems at no cost to you.

THE AMERICAN MONORAIL CO.

13103 ATHENS AVE. • CLEVELAND 7, OHIO

competitive capitalism is just as good for him as it is for those who are bosses. It is claimed that the idea has not been sold and some executives wonder if as much effort has been devoted toward doing this as could be.

While some labor sources say that it is inevitable that foremen and supervisors will some day become organized into unions, the question still remains of how far union membership should go up into the ranks of management. Obviously, if all management is union-organized, the historic relation of worker and employer will disappear in all companies except those which are sole proprietorships.

* * *

One argument the unions have advanced is that foremen have production responsibility, but that they no longer have the right to hire or fire and in cases of a labor dispute, the question is taken to the shop steward. More and more staff functions have been delegated away from foremen to the point that they no longer feel that they are a part of management, it is said.

Perhaps one way to stop the organization of supervisory employees is to return to them the authority that has been taken away from them so that authority is balanced with production responsibility. In many cases, this may prove to be difficult.

* * *

The Supreme Court dealt a serious set-back to hopes of many companies who expected to one day ask for court review of War Labor Board decisions by refusing to consider the ruling of the Court of Appeals of the District of Columbia that WLB decisions are not reviewable. The implication of this decision, although it may be magnified beyond reasonable apprehension in the minds of some, is that the decisions of administrative bodies in general may become in the future less and less subject to judicial review.

Controls Relaxed On Metal Doors, Frames And Shutters by WPB

Washington

• • • **Revocation of L-142** recently removed control over the manufacture of metal doors, metal door frames and metal shutters, but in taking this action WPB pointed out that only a small increase in production is expected as control will still be exercised through quarterly CMP allotment of materials. An estimated 41,000 tons of carbon steel or an equivalent amount of aluminum will be used for these products in 1945, as compared with 30,000 tons of steel allotted in 1944.

WPB also removed restrictions on types and sizes of enameled ware from L-30-b but said that the order continues to restrict the use of iron and steel for civilian enameled ware production to 70 per cent of usage in the year ended June 30, 1941. It was explained that permission to make enameled ware in any desired size will enable manufacturers to nest articles more closely in packing and will result in a saving of paperboard shipping containers. Provision was made for the assignment of iron and steel quotas to manufacturers who have none.

In another action WPB added five items to the list of galvanized ware articles that may be made under L-30-a. Over-all production of galvanized ware will not be increased since additional steel is not being made available for the newly permitted items.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

YOU'VE GOT HIM A JOB IN THE SHOP-- BAH! THE SHOPS! YOU'VE BEEN IN 'EM 30 YEARS, AND WHERE ARE YOU? HE'LL TAKE UP SOMETHING WHERE HE CAN ADVANCE!
DOESN'T SHE REALIZE THERE'S BIG POSITIONS IN SHOPS, LIKE SUPERINTENDANTS, MANAGERS OF DEPARTMENTS, GENERAL MANAGERS, VICE PRESIDENTS, PRESIDENTS AND OWNERS?
WELL, YOU TACKLE HER FROM A DIFFERENT ANGLE THAN THAT-- DON'T MENTION THEM! I LOOK BAD ENOUGH AS IT IS-- DON'T MAKE ME WORSE!
J.R.WILLIAMS
HEROES ARE MADE-NOT BORN
T. M. REG. U. S. PAT. OFF. COPR. 1944 BY NEA SERVICE, INC.
11-24

War Expenditures Rose 4.8 Per Cent in October

• • • **United States** war expenditures amounted to $7,447,000,000 in October, an increase of $343,000,000, or 4.8 per cent, over expenditures in September, according to figures compiled by the Treasury Department and announced by the War Production Board.

Expenditures per day for war purposes during October averaged $286,400,000, an increase of $13,200,000 over the September daily rate. The daily rate is based on the 26 days in each month upon which checks were cleared by the Treasury.

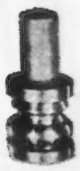
From July 1, 1940, through Oct. 31, 1944, the U. S. Government has expended $229,600,000,000 for war purposes.

These figures include checks cleared by the Treasury and payable from war appropriations, and net outlays of the Reconstruction Finance Corp. and its subsidiaries.

THREADS and FORMS

PLUNGE GROUND

WITH CRUSHER DRESSED WHEEL



The crusher dressed multi-ribbed grinding wheel offers important savings in both time and production costs in grinding precision threads and circular form or profile work.

In a plunge cut with such a wheel on the Sheffield Thread and Form Grinder, a single or multi-start threaded section, the length of which does not exceed the thickness of the wheel, is completed in 1-⅗ revolutions of the work part. For larger parts traverse grinding is used.

Wheels are crusher dressed in a small fraction of the time it takes by conventional methods and they have more effective cutting surfaces. Furthermore, the multi-ribbed wheel stands up longer.

Write for technical bulletin.

THE SHEFFIELD CORPORATION

Dayton 1, Ohio, U.S.A.

MACHINE TOOLS • GAGES • MEASURING INSTRUMENTS • CONTRACT SERVICES

WEST COAST . . . OSGOOD MURDOCK

• From feverish shipbuilding activities on the Columbia and Willamette Rivers are emerging industrial forging, casting and fabricating suppliers with standard products, and production processes.

PORTLAND, OREGON — Around 100,000 men and women are now directly employed in shipbuilding in the immediate vicinity of Portland. Three-quarters of them work in the three big Kaiser operated yards, Oregon Ship, Swan Island and Vancouver. Others work for six or seven other firms, the most important of which are Willamette Iron & Steel Corp.; Commercial Iron Works; Albina Engine & Machine Works; Poole, McGonigle & Jennings; Buckler at Vancouver and Gunderson Bros. Engineering Works.

Backing these up, supplying component parts, sub-assemblies, castings, forgings and various materials, catering to and transporting the workers, as well as repairing maritime ships on favorable inland fresh water and warehousing, assembling and shipping lend-lease supplies principally trans-Pacific to Soviet Russia—these direct war activities absorb the congested yet increasingly orderly and well-directed attention of all industry and commerce and transportation in the Portland metropolitan area.

After three years of emergency operation and now practically complete conversion of a former lumber manufacturing and domestic distribution port and center to a war manufacturing and shipping base, Portland heavy industry presents a most interesting and absorbing moving picture, with suggestive post war implications. For, in the midst of its emergency activity, the community as a whole and each principal individual factor is planning for the future and nourishing and cultivating those roots which promise to survive and grow on in the more solid soil of long-run peacetime operation.

An active and well supported industry committee of the Local Chamber of Commerce includes in its interested and working membership the men at the head of principal industries and factors in the area, such leaders as T. H. Banfield, president, Iron Fireman; Clarence C. Johns, division manager, Columbia Steel Co.; Amedee M. Smith, president, Willamette Iron & Steel Corp.; Albert Bauer, assistant general manager, Oregon Shipbuilding Corp.; George H. Wisting, vice-president, Columbia Aircraft Industries, Inc.; Orville Miller, past president, West Coast Lumbermans Assn.; Ralph Montag, stove manufacturer, along with the heads of banks, utilities, railroads and other leading manufacturing and commercial institutions. A fund of $150,000 has been contributed by these firms for an industrial development campaign under the joint direction of P. M. Robinson, secretary of the committee, and C. E. Seage, an industrial engineer who is directing the campaign to protect present industries, solicit new industries that economically belong to the area, work on traffic problems and in general coordinate and integrate the long-run industrial picture. Definite applications are on file from 50 or 60 nationally operating firms who contemplate establishing branch plants or distributing houses in the Pacific Northwest post war. With reference to industry in general it is the aim that 40 or 50 firms employing from 500 to 1000 men in the long run will replace the present three or four firms employing from 1000 to 75,000.

At present one-third of all workers in the Portland area are engaged on shipbuilding activities, one-third in the timber and lumber industry and one-third in all other commercial pursuits.

ASSUMING that the Kaiser yards and Willamette Iron & Steel will not be building many ships a year from now and that a large proportion of their 85,000 or 90,000 workers will be doing something else, either in other heavy industry or back home or on the attractive, promising undeveloped backlands of the Pacific Northwest, what is in prospect with the smaller but now sizeable industrial operators whose volume has been swollen in shipyard supply?

Pacific Chain & Manufacturing Co., for instance, with its subsidiary, the DPC Pacific Steel Foundry, is practically a war baby but has now become the second largest producer of anchor chain nationally and licenses five other manufacturers for its Union Melt process of electric welding any kind of bar stock and its patented machines for forming the bars and its method of welding as applied to chain. This process speeds up production and reduces to 10% the tremendous investment expense involved in continuous casting or drop forging for anchor chain. The same process will in peacetime apply to sawmill, pump mill, mining and general industry applications. Its single small production line in 1941 has now become five big production lines. Whereas one set of anchor chains a week was the production limit at the start of 1942, now ten is a minimum and as high as 73 sets a week have been produced. Robert Miller, W. A. Deming and E. J. Burke are the principals and their prospects for coastwide and nationwide operations postwar are promising.

Electric Steel Foundry Co. was well known prewar in mining, logging and industrial circles for its Esco drag line buckets, ship rigging, logging rigging and ball mill liners and crusher jaws for hard rock mining. Its interlocking associate and subsidiary, the Willamette Huster Co., has developed international demand for its portable lifting and conveying equipment. Induction furnaces have been added in the last few years for centrifugal casting and the plant now operates three induction and three arc furnaces. It faces a bright prospect for the supply of its standard products, with improved war built facilities and production experience.

Gunderson Bros. Engineering Works have been building life boats in large quantities for cargo ships, and one of their engineers, L. S. Baier, has designed an all steel fishing boat 80 ft. long as a trawler and purse seiner that promises sensational replacement possibilities for the Puget Sound, Alaska and offshore fishing fleets. By adapting aircraft fuselage construc-

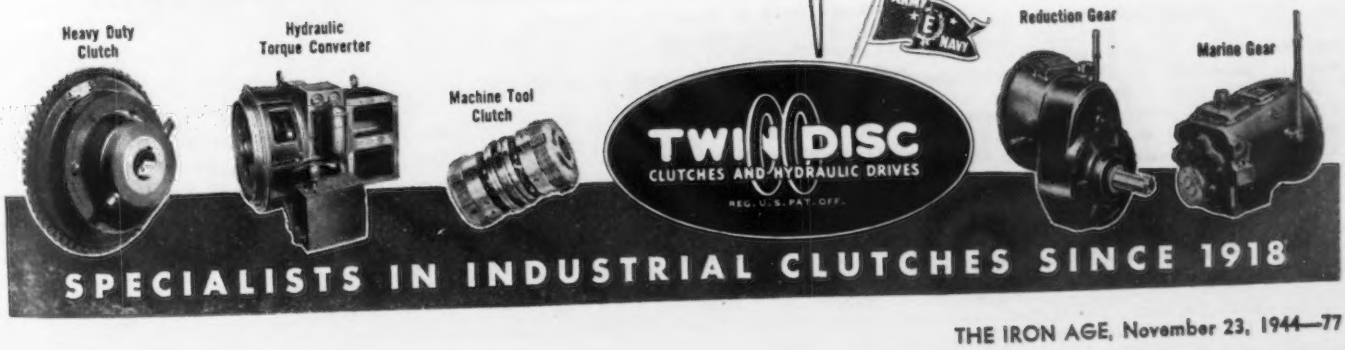
Trail WITHOUT A TURN

It's in his blood, this sourdough son of a forty-niner. He can tell you of the Klondike where the "pay dirt" ran 15 ounces to the pan . . . or of many another rich diggings where a man could make his pile and quit—but seldom did.

For this grizzled prospector, the quest for gold is an endless trail from which there is no turning back . . . a trail that has no turn. For the Twin Disc Clutch Company, the quest is not for gold—but for ever more efficient methods of linking driving and driven members of the powered equipment you design, build or operate.

To the pursuit of this objective, Twin Disc has devoted more than 26 years. This quarter-century's experience is today reflected in the comprehensive line of Twin Disc power links—both friction clutches and hydraulic drives—which assure the accurate control and transmission of power in virtually all industries. It is reflected in the new developments in materials and in the advanced manufacturing techniques which have endowed Twin Disc products with the essential quality of long and efficient wear-life. And finally, this experience is reflected in the country-wide service and parts organization provided for the protection of every Twin Disc user.

If the plans you now have on the boards involve a power linkage problem, you stand to gain by calling on Twin Disc "know how". The recommendations of Twin Disc engineers will be impartial as to "friction or hydraulic" . . . freely given without obligation. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).



tion principles, conventional horizontal ribs are eliminated.

Hesse-Ersted's electric steel rolling mill is operating to capacity and with gratifying and promising future prospects. Only a present limitation of manpower and available electric power retards the operation of both 25-ton electric furnaces. On the present 20 and 14 mill combination between 20 and 33 tons per hour of flats, rounds and halfrounds are being turned out. Its rounds are extensively used by Pacific Chain for welded anchor links. Soon after the first of the year the 12 and 9 mill will be in operation to produce light bars and rather complete stocks for the local warehouse and supply trade.

Beall Pipe & Tank Corp. has recently announced perfection and production of a new alloyed, tempered aluminum pipe for portable irrigation systems. Only one-fourth as heavy as galvanized steel tubing, the new pipe can be made and handled afield in 40-ft. lengths instead of the customary 20-ft. galvanized section.

Columbia Steel Castings Co. has operated for 45 years and was the nucleus for the original Columbia Steel Co. When wartime Liberty ship requirements put the bee on the steel foundry industry in the Pacific Northwest, Columbia had a 50-ton furnace, a seven and a half ton furnace and a six ton furnace, but that wasn't enough so DPC added a $1,000,000 foundry addition with a 100-ton electric furnace. All Columbia's casting is done in flasks above ground and no pits are used, greatly speeding up production, so that a stern frame is turned out in two days instead of five days. Columbia's H. F. Dick is justly proud of the foundry's record in turning out 384 15-ton stern frame castings for Liberty ships in 384 days. For Victory ships the stern frame casting weighs 38 tons and 26 of these have been turned out in a single month. This plant also casts one-piece steel propellors and one such wheel weighing 19 tons, 19½ ft. in diameter, was cast for the Russian government which insists on steel wheels for their ships operating in northern waters. This plant has a practical, economical capacity of 1500 tons per month and deserves consideration in any man's post war picture, from either a nationwide or coastwide prospective.

DESPITE general recognition that post war aluminum reduction operations cannot continue in the Pacific Northwest on the wartime scale and that a number of the DPC plants along the Columbia River using Bonneville-Coulee power will not be operated to capacity for some time, there was great recent interest in the local announcement of Arthur P. Hall, chairman of the committee on post war facilities and development for the Aluminum Co. of America that Alcoa will "probably build on the Columbia River a plant to reduce bauxite to alumina." His company built the first Northwest aluminum reduction plant with its own funds at Vancouver in 1940 and since then has built and is operating huge DPC reduction plants at Troutdale, Oregon, and Spokane and the rolling mill at Spokane.

Over 2,000,000 long tons of ferruginous bauxite ore has recently been indicated and drilled by the Department of Geology and Mineral Industries of the State of Oregon in a deposit in Washington County only 25 miles northwest of Portland and easily accessible to the Columbia River. The ore runs 32.8 per cent alumina, 24.6 per cent iron, 9.5 per cent silica, 3.5 per cent titania and 0.150 per cent phosphorus. Director F. W. Libbey acknowledges that more intensive exploration of the deposit is necessary to determine quantity and quality of ore available but "it is believed any such changes will be along the lines of enlarging and defining ore reserves rather than detracting from their importance." It is suggested that the Pederson process has been used in Norway to treat similar material to produce both iron and alumina to supply the local market, but that ideally from 20,000,000 to 40,000,000 tons of ore should be proved or indicated to justify a commercial installation.

Civilian Products To Benefit from WPB Copper Relaxations

Washington

• • • **Prewar serviceability** will be restored to a number of highly important civilian products and components through a supplemental fourth-quarter allotment of 16,030,000 lb. of copper-base alloy, WPB-OCR has announced. Warning was given that many products using the copper will not come into the market for some time, since manufacturers will have to order the copper and arrange to process it.

Among the products that have suffered in varying degrees through the substitution of less suitable materials for copper and brass and that will be restored to normal or nearly normal composition—except for plating—are a wide line of plumbing and heating components such as strainers, faucets, shower arms and tank floats and other products such as safety pins, slide and snap fasteners, scales, underground water and gas service connections, interior working parts of mechanical pencils, badges for public and private law enforcement officers and plant protection personnel and fare tokens.

The supplemental allotment, made by the Requirements Committee is large enough to allow reconversion to normal copper usage of most of the listed products at their present levels of production. In the other cases, it will allow a return to the use of copper in the parts that have been most adversely affected by the use of substitutes.

Cited for Awards

• • • **The following** companies have received awards for outstanding war production:

Army-Navy "E"

Daystrom Corp., Olean Plant, Olean, N. Y.
Electric Household Utilities Corp., Hurley Machine Division, Chicago.
Fred C. Good & Sons, Inc., Philadelphia.
Gorman-Rupp Co., Mansfield, Ohio.
Land O'Lakes Creameries, Inc., Land O'Lakes Dairy Co. Whitehall, Wis.
A. Leschen & Sons Rope Co., St. Louis.
National Drug Co., Swiftwater Biological Laboratories, Swiftwater, Pa.
National Sewing Machine Co., Belvidere, Ill.
Railley Corp., Cleveland.
Rex Products Corp., New Rochelle, N. Y.
Shields, Inc., Attleboro, Mass.
J. K. Smit & Sons, Inc., New York.
Standard Foundry Co., Racine, Wis.
Albert Trostel & Sons Co., Milwaukee.
United Transformer Co., Varick & Hubert Street Plant, N. Y.
Weatherhead Co., Columbia Products Division, Columbia City, Ind.
West & Dodge Thread Gauge Co., Inc., South Boston, Mass.
Westinghouse Electric & Mfg. Co., Lima, Ohio Plant, Lima, Ohio.
L. A. Young Spring & Wire Corp., Chicago Division, Chicago.

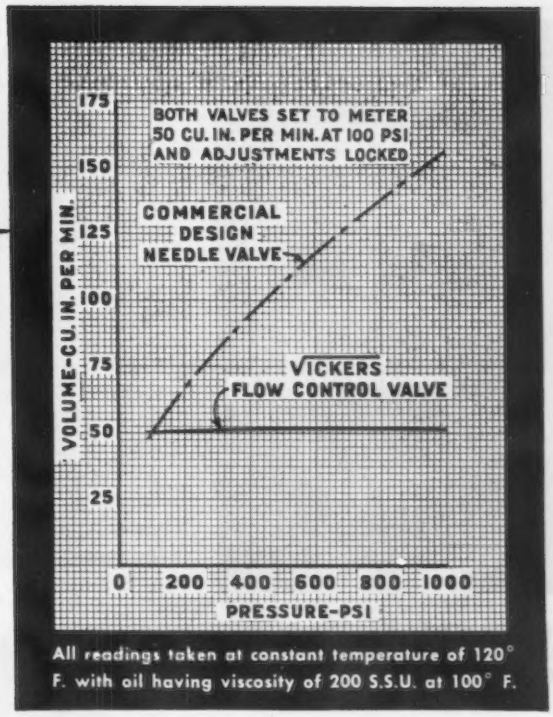
Maritime "M"

Curtis Lighting, Inc., Chicago. (second star)

CONSTANT FLOW RATE

REGARDLESS OF VARIATIONS

IN FLUID PRESSURE



All readings taken at constant temperature of 120° F. with oil having viscosity of 200 S.S.U. at 100° F.

VICKERS

FLOW CONTROL AND OVERLOAD RELIEF VALVES

In hydraulic control systems, this valve combines the functions of a flow control valve with an automatic relief valve to save space and simplify installation. It maintains a constant "metering-in" flow rate (for a given setting of the control adjustment) regardless of any variation in imposed fluid pressure resulting from changes in work resistance. Pump operates only at pressure required to do the work at hand; relief valve is independently adjustable and limits the maximum system pressure to any desired value.

This valve combines in one unit the means for accomplishing three independent functions: (1) adjustable control of flow rate in the hydraulic circuit, (2) adjustable overload pressure protection in the hydraulic system, and (3) remote "Start and Stop" control when used with suitable pilot valve. See Bulletin 40-22 for complete information. Vickers Application Engineers will gladly discuss with you how "hydraulics" can be used to your advantage.

VICKERS *Incorporated*

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Application Engineering Offices: CHICAGO • CINCINNATI • CLEVELAND • DETROIT • LOS ANGELES • NEWARK • PHILADELPHIA • ROCHESTER • ROCKFORD • TULSA • WORCESTER

Representative of More than 5,000 Standardized Vickers Units for Every Hydraulic Power and Control Function

PERSONALS

GEORGE F. FARLEY, vice-president in charge of sales, Milwaukee Metal Spinning Co.

• **George F. Farley** has been elected vice-president in charge of sales for Spincraft, Milwaukee Metal Spinning Co., Milwaukee. In his new capacity Mr. Farley will be responsible for all sales activity, product development and postwar planning.

• **John P. Fleming** has been appointed general manager of the Barium Steel Corp., Canton, Ohio. Mr. Fleming, for the past 14 years, has been associated with American Locomotive Works at Schenectady, N. Y.

• **David M. Salsbury** has been elected vice-president and general manager of the Westinghouse Electric Supply Co., New York.

• **Archer W. Richards,** general manager Geometric Stamping Co., Cleveland, until joining Smaller War Plants Corp. as director subcontracting 5th Region, has been appointed vice-president in charge of contracts, Designers For Industry, Inc., Cleveland.

• **W. O. Lippman** has been named manager of the Electric Appliance Division Works, East Springfield, Mass., of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. He will also retain his Ordnance Division post at Canton, Ohio. **J. C. Smith** has been appointed manager of manufacturing at Canton. **R. W. Beil** has been appointed general contract manager at East Pittsburgh and **C. F. Lloyd** has been made assistant to manager of the Industry Departments.

• **Charles M. Green** has been elected vice-president for manufacturing of the Sperry Gyroscope Co., Brooklyn, N. Y. **Louis F. Malkovsky** has been made vice-president for manufacturing planning. Mr. Green was with the Remington Arms Co. for 10 years, filling various executive positions.

• **John R. Tidd** has been appointed manager of the International Harvester Co.'s general line branch in Buffalo, succeeding **G. Victor Mea,** who has been named manager of the company's Syracuse branch. Mr. Tidd has been associated with International Harvester for 28 years, the last eight as manager at Syracuse.

JOHN T. GILLESPIE, Jr., manager of export sales, Watson - Stillman Co.

• **John T. Gillespie, Jr.,** has been appointed manager of export sales, Watson-Stillman Co., Roselle, N. J. During the past 2½ years, Mr. Gillespie has been with the Shipbuilding Division of WPB and previously with the OPM Contract Distribution Division, U. S. Maritime Commission, on a leave of absence from the Air Reduction Co., Inc.

• **Frank J. O'Brien** and **Eugene J. O'Connor** vice-presidents of the Continental Can Co., Inc., New York, have resigned.

• **Paul James** has been appointed district manager of the Syracuse office, The Lincoln Electric Co., Cleveland. **E. L. Smith** has been appointed district manager of the company's Rochester office succeeding Mr. James.

• **F. Cyril Greenhill** has been elected president and assistant treasurer of the Acklin Stamping Co., Toledo. Mr. Greenhill succeeds the late Frank E. Graper.

• **William J. Stebler,** vice-president of the General American Transportation Corp., Chicago, has been made general supervisor of manufacturing for the entire corporation.

• **Ralph W. Gordon** has been appointed manager of the Time Study and Standards Department of the B. F. Goodrich Co., Akron; **W. A. Smith** has been appointed manager of suspension sales, Industrial Products Sales Division.

• **C. P. Judge** has been made divisional manager for the Pittsburgh district of the Gould Commercial Division, National Battery Co., St. Paul, Minn. **Leslie E. Howard** has been appointed sales engineer for the Spokane and Salt Lake City territories, and **A. J. Miller** has become sales engineer for the Detroit district.

• **William O. McMahon** of Birmingham, has been appointed southern area technical consultant of the Gray Iron Founders' Society, Cleveland. Mr. McMahon formerly was chief foundry metallurgist of the Sloss-Sheffield Steel & Iron Co. and is now its consulting metallurgist.

• **A. F. Dobbrodt** has been appointed district manager of the Pittsburgh district office, Carboloy Co., Inc., Detroit. Mr. Dobbrodt joined Carboloy in 1929. Since September, 1942, he has been manager of the Southern District, which will now be handled from the Pittsburgh office.

A. F. DOBBRODT, Pittsburgh district manager, Carboloy Co., Inc.

• **J. H. Callan** has been elected president Crucible Steel Co. of America, New York. Formerly a member of the executive committee and general assistant and adviser to the president, Mr. Callan has been with the company 24 years.

• **A. C. Reppenhagen,** former general manager of Experimental Tool & Die Co., has been named secretary of Mid-West Abrasive Co., Detroit.

• **Arthur H. Hanks** has been made superintendent of the cold drawn department of Allegheny Ludlum Steel Corp.'s Dunkirk, N. Y., plant. Mr. Hanks was assistant superintendent and succeeds the late E. H. Highley.

• **Walter J. Bloom** has been appointed assistant district sales manager of the Detroit district for the Weirton Steel Co., Weirton, W. Va. Mr. Bloom for the past two years has been attached to the Sheet and Strip Steel Branch of the WPB Steel Division in Washington.

• **D. H. Young** has been appointed director of exports for the Universal Engineering Corp., Cedar Rapids, Iowa.

• **S. R. Edwards** has been placed in charge of the new Southwestern sales office of the Yarnall-Waring Co., Philadelphia.

• **J. L. Stuart** has joined the technical staff of Sperry Products, Inc., Hoboken, N. J., as technical editor.

• **Bennett Burgoon, Jr.,** for several years representative at Rockford, Ill., of Kennametal, Inc., Latrobe, Pa., has been made district manager in charge of the Detroit office.

• **Ralph M. Hinckley** has been appointed abrasive engineer in the Milwaukee territory by Norton Co., Worcester, Mass. Mr. Hinckley was formerly grinding wheel specialist with the John Pritzlaff Hardware Co., Milwaukee.

• **Harold E. Murken** has been appointed controller and assistant secretary; **T. Webster Matchett** has been made secretary and **John T. Hoyt** has been appointed treasurer, Robbins Conveyors, Inc., Passaic, N. J.

• **Emerson D. Lapsley** has been appointed manufacturing manager of the Ordnance Division in Burlington, Vt., of the Bell Aircrfat Corp., Buffalo, succeeding **Carl F. Lozon,** resigned. **Jacob J. Joachimi** has been named acting manager of the Elmwood plant, Buffalo.

THEODORE S. BONNEMA, vice-president in charge of production, Oster Mfg. Co.

• **Theodore S. Bonnema,** formerly production manager, has been appointed vice-president in charge of production, and **Lester D. Martin,** formerly comptroller has been made treasurer of the Oster Mfg. Co., Cleveland. Both men have been connected with the company in various capacities for more than 20 years.

• **W. H. Russell** has been appointed district manager of the Southwestern district sales office in St. Louis, of the Baldwin Locomotive Works, Eddystone, Pa. Prior to joining Baldwin Mr. Russell was affiliated with the Elastic Stop Nut Corp., Newark, N. J.

• **Clarence L. Collens,** for 37 years president, Reliance Electric & Engineering Co., Cleveland, has been elected to the newly created post of chairman of the board. **James W. Corey,** sales vice-president since 1940, has succeeded Mr. Collens as president. **H. M. Hitchcock,** senior vice-president and treasurer, will retire December 31, and be succeeded by **A. M. MacCutcheon,** engineering vice-president.

• **George Fay** has resigned as treasurer af the Hydril Corp., Los Angeles, to become comptroller of the Rheem Mfg. Co., New York.

• **A. L. Campbell,** for the past two years in charge of outfitting at the Pittsburgh-Des Moines Steel Co. shipyard at Neville Island, Pa., has resumed his duties as contracting engineer in the company's Southwestern division, with headquarters in Dallas. Mr. Campbell has been associated with the company for nine years in various engineering capacities.

• **D. C. Storm,** formerly general superintendent of the St. Louis Ordnance plant, has been appointed works manager of the East Alton, Ill., plant of Western Cartridge Co. Mr. Storm has succeeded **F. A. Schotters,** who has been appointed to the staff of Olin Corp., the parent company of Western Cartridge Co. and the Winchester Repeating Arms Co. Division.

• **George L. Wiley** has joined the Big Three Welding Equipment Co., Houston, Tex., as welding consultant.

OBITUARY . . .

• **J. W. Sullivan,** chairman of the board of Skilsaw, Inc., Chicago, of which he was the founder, died recently. Mr. Sullivan was 73 years old.

• **Alonzo A. Whitcomb,** general superintendent of the Heald Machine Co., Worcester, Mass., and associated with the company 39 years, died November 1.

• **Walter J. Krause,** electrical engineer for 25 years with the Ohio Electric Mfg. Co., Cleveland, died November 9.

• **Walter B. Minch,** 67, works manager of the McKeesport Plant, Jones & Laughlin Steel Corp., Pittsburgh, died November 8.

• **Adolph Lauersdorf,** founder and head of the Aelco Brass Foundry, Milwaukee, died November 7 at the age of 71.

• **Dr. Beram D. Saklatwalla,** 63, consulting metallurgist and former senior vice-president and research director of the Vanadium Corp. of America, New York, from 1919 to 1935, was killed in an airplane accident at Hanford, Calif., on November 4. In 1909 Dr. Saklatwalla, a native of India, came to the United States and joined the newly organized American Vanadium Co. of Pittsburgh. The next year he was made general superintendent of the Vanadium Corp. of America, and ten years later became vice-president. Since 1938 he had been chairman of the board of the Alloys Development Corp. Dr. Saklatwalla was well known for the development of vanadiium's use in metallurgy and the designing of special electric furnaces.

• **Howard Woodfin,** president of the Lincoln Iron Works, Rutland, Vt., died suddenly November 2. Mr. Woodfin was 61 years old.

Fatigue Cracks

BY A. H. DIX

Melancholy Swede

• • • A gloomy Swedish economist, Professor Gunnar Myrdal, points a boding finger to a potentially weak spot in the postwar anatomy. He fears that this country will be physically unable to absorb the vast output of goods necessary to provide high level employment.

To support his contention he says, for example, that even if the automotive industry doubled its best year, 1937, when it produced cars to the value of $5 billion, it would still have to lay off hundreds of thousands of workers.

The Committee for Economic Development will be glad to hear that this page does not share the professor's dismal view. As we see it, it is all a matter of rationing, for consuming power is unlimited. The influence of advertising is enormous, but if not enormous enough to chew up all that our mills can turn out, then the job can be done by edict. This means rationing, but in reverse of what it is now.

Say, for instance, that like us, you find it hard to consume more than one pair of shoes a year. Shoe workers must be kept employed, so your share may be three pairs. While on your own premises you may cheat by putting on the paint-spattered moccasins you have owned ever since you were an eagle scout, when you go out on the highways you will of course wear a legal new pair, lest you be picked up by a shoe inspector.

Life may be idyllic for you with only one bathroom, but pottery plants and plumbers have to provide jobs, so you will have six months in which to arrange for your allotment of an extra one or two. You may need a second car no more than a third nostril, but only bachelors will be exempted from the order. Your parlor couch, now broken in, may have to make way for a less comfortable newcomer.

The patch, now a badge of honor, will become the sign of an economic lawbreaker. Watch for surreptitious displays of shirt tails in washrooms, with furtive whispers, "Look! Mended!"

We have not quite figured out what to do about the liquor industry, as people are stubborn and enforced consumption might accomplish what the prohibition party has never been able to put over, but there is probably a medicinal angle that can be worked in here and we will give it some thought.

D.S.N. Candidate

Should not Bourke Blakemore Hickenlooper, the new Republican senator, qualify for the Distinguished Name Club?

—H. C. Boynton, Consulting Metallurgist, John A. Roebling's Sons Co.

It would be difficult to keep the Senator out, but still we are not especially happy over his admission, as the Club is not for people whose names are technicolored from beginning to end. We favor those that start off dun, rise suddenly to a pyrotechnic display, and sink as suddenly to dun again. B. Hickenlooper Jones, for instance, would be perfect.

One and Only

• • • Our co-worker, Frank Joseph Oliver, who is your favorite family journal's technical editor, said that the other day he asked a prospective contributor what his company connection is. The answer was, "I am with the Government." "What branch?" Frank continued. The man said, "The British Government, of course."

Consonantal Rhapsody

• • • We would like to compliment Frank's sidekick, J. (for Joe) Albin on a pretty word we found in his series on precision castings. The word is "Debubbilizer."

The inventor of this delightful oral exercise could have given the product a name lacking in imagination, like "anti-bubble compound," or one deficient in dignity, like "No-Bub." But both extremes were avoided, and the language is the richer. To us "Debubbilizer" is beautiful.

Blurb

• • • As you know, the "lost wax" process for making precision castings was something of a secret art until your favorite family journal pulled the veil. While we are giving the brains department's back a once-over lightly we might as well remark that veil-pulling is habitual with our editors. Other recent instances are the series on thread rolling and the study on direct casting.

In these three typical instances, knowledge that had hitherto existed in only a few specialists' minds has been made available to all. This kind of information is difficult to get. We often think that our old flag, "The World's Greatest Industrial Paper," should be unfurled.

Sometimes They Don't

You speak of liquid syllables in English addresses, and cite, "Montrose, Stanley Road, Battledown Cheltenham, Gloucestershire." My friend, James Brodhead, with Procter & Gamble at Newcastle-on-Tyne before the war, tells me that probably with good British treatment, the "ham" in Cheltenham would be muted to a whisper and the "shire" after Gloucester would vanish completely as the voice in laryngitis.

So you have "Chelten'm, Gloster." However, the next time on a long one like Northamptonshire (I think I'm right) the British will pronounce every syllable clearly and accent the "shire" to boot, just as a certain newscaster is careful to pronounce Worcester, Mass., "Wor-ses-ter."

—L. B. Shapleigh, Bethlehem Steel Co.

In confirmation of Mr. Shapleigh's statement we cite the experience by a salesman friend of ours who was sent over to England by International Business Machines before the war.

He set out by car to call on a prospect located in a small town with a long name. The name escapes us but Cholmondeley will do. Not wishing to appear ignorant, in asking directions he slurred the name in what he regarded as the English fashion. But everyone he asked merely looked puzzled and said, "Never heard of it." Finally he struck a young man who was more than ordinarily patient and listened to various renderings of the name. Suddenly the young man's face lightened. "You must mean," he said, coining each syllable carefully, "Choll-mon-dell-ee."

Puzzles

You would have no difficulty at all in walking under last week's telephone wire, as the difference in circumferences would be 50 ft. divided by π, or about 16 ft. Thus the poles would be about 48 ft. high.

Practically every one of this page's loyal army of eighteen readers has told us how to express 32 by means of five 3's:

A. C. Wilcox. $3^3 + 3! - \frac{3}{3}$; Miss Emma Frankel, $\frac{3 \times 3 + .3 + .3}{.3}$; Allan G. Stern, $3^3 + \frac{3}{.3 + .3}$; an anonym, $3! \times 3! - 3 - \frac{3}{3}$.

Other successful solvers are W. G. Buehler, C. I. Lusink, and A. R. Mosler, Jr. The last named writes, "Lately your puzzles have not been up to par." This is a sentiment with which we heartily agree. The situation has caused us much worry, and we see no cure, for the puzzle-inventing industry has apparently fallen off to practically nothing.

For months now we have been scraping the bottom of the barrel and would be in a bad way if people like R. H. (General Electric) Rogers did not help us out. His contribution is this:

An unscrupulous woman and a gullible one together prepared an 8-in. ball of yarn. Upon dividing it the first woman wound the yarn off into a skein until the remaining ball was 4-in. dia. When she got home she wound her yarn into a ball. What was its diameter and what per cent of the whole did each woman get?

A name worth remembering!

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After the war, the name Fairbanks-Morse will continue to mark performance-proved products only, as it has for 114 years.

No race to get civilian products onto the market early will tempt us to break this pledge.

Fairbanks-Morse Scales are precision-built instruments which provide mechanically perfect weight recording. Of sturdy scientific construction without springs or delicate parts, the countless types, styles, and modifications serve American business and industry by keeping books, records, and inventories, saving time, preventing errors, and speeding production.

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FAIRBANKS, MORSE & CO., CHICAGO 5, ILLINOIS

Dear Editor:

"G" IRON

Sir:

We were much interested in reading in the *Iron and Coal Trades Review* of an American blast furnace technique permitting the charging of titanium-bearing material in the furnace burden, the resultant pig iron being called "G" iron. Can you give us the name and address of the American firm referred to?

DIRECTOR

F. Haeberlin, Ltd.,
5 Whittington Ave.,
London, E.C. 3, England

● "G" iron is made by the Tonawanda Iron Corp., North Tonawanda, New York. C. R. Holzworth is manager.—Ed.

SENDZIMIR MILL

Sir:

On reading your issue of July 23, 1942, we noted with interest an article on the Sendzimir mill. We should be glad if you will put us in touch with the manufacturer.

E. ARTHUR WILLIAMS
Clayton Tin Plate Co., Ltd.,
Pontardulais, Swansea,
England

● We suggest you write to Thaddeus Sendzimir, American Rolling Mill Co., Middletown, Ohio.—Ed.

ELECTROSTATIC SPRAYING

Sir:

I would appreciate further information in connection with spraying metal parts in an electrostatic field. This subject is mentioned in your Oct. 26 "News Front."

E. S. BARNHART, Director,
Tool and Process Engineering
Eastern Aircraft Division,
General Motors Corp.,
Bloomfield, N. J.

● See the leading article in the Oct. 19 issue, "Electrostatic Spraying and Detearing," by Harry Forsberg, president of The Japan Co., Cleveland. Maker of electrostatic spraying equipment is the Harper J. Ransburg Co., Indianapolis 7, Ind.—Ed.

INDUSTRIAL INDEX

Sir:

What years do you take as a base for arriving at the industrial production index in this country? I assume such index will be considered on the basis on 100 per cent capacity. If so, what year or percentage of the base years has been considered an average year?

M. RAY PEARCE,
District Manager
Hanson-Whitney Machine Co.,
622 W. Washington Blvd.,
Chicago 6

● We do not publish an industrial production index. In calculating the weekly operating rates for the steel industry a capacity figure is established each six months on the basis of new construction and changes in design and capacity of steel producing units throughout the country. This gross capacity figure is further adjusted to provide for normal time out for repairs. Therefore, the final figure is such that if the steel capacity operating rate for a particular week is shown to be 100 per cent, it means that the producing units are making steel at the highest possible rate with normal repair time.—Ed.

MILLIMETER MIX-UP

Sir:

I noted with some astonishment from the Aug. 24 "Dear Editor" letter headed, "Millimeter Mix-Up," that a go-ahead people like the Americans were still clinging to an archaic system of weights, measures and temperatures. Actually the error which inspired your correspondent's letter had nothing to do with the system of units used, and would have caused a discrepancy whatever system of units were used, and it seems to me to be about the most feeble of grounds to railroad the most sensible system—the c.g.s.—of units on.

In this country the quaint system of £s.d. is in use—12d equal 1s, and 20s equal £1. The decimally oriented Americans usually ask "What is it in real money?" In the U. S. oilfields the foot is used as a unit, but it is almost always divided into tenths of feet. Such a hybrid system would appear to indicate a ridiculous obstinacy to refrain from using a perfectly good existing decimal system. In the same way, the Fahrenheit temperature scale is just as much out-of-date as all the other ridiculously involved British systems of units of weights and measures are.

In the scientific faculties—chemistry and physics—in the universities here and I believe in the U. S. A., the c.g.s. units are used exclusively, yet in the same universities the engineering faculties persist in using the weird and wonderful English units with all their well known disadvantages.

The mass time-saving you desire to achieve by converting metric to English units will be multiplied by a factor of considerable magnitude if you could persuade your readers to use the c.g.s. system exclusively. Why it is desired to perpetuate the English system of units with its peculiar lack of rational relationship, has always been a profound mystery to me.

H. DeWILDE
Arundale, Anglesey Road,
Kingston on Thames,
Surrey, England

CORE SOLDER

Sir:

We are interested in core solder. Do you have any information on this type machine, the process or name of manufacturers of core solder machines?

D. E. SPAULDING,
Manager
Empire Metal Co.,
Syracuse, N. Y.

● We believe the core solder is manufactured in an extrusion press and suggest you get in touch with builders of that equipment.—Ed.

THREAD ROLLING

Sir:

We found your article, "An Appraisal of Precision Thread Rolling Practice," in the Nov. 2 issue very interesting and informative. There is one point that we question and wonder if you could elaborate on it to some extent.

On page 50, first column, first paragraph, beginning, "Because of the better surface produced in the profile of the thread . . ." you indicate that it would require more torque to drive a roll thread product than would be the case with a cut or ground thread product. We have never seen any tests to substantiate this viewpoint, and from theoretical conclusions we would expect the torque to be less on a roll thread product because of the much lower coefficient of friction. Have you any data on this point?

W. C. STEWART,
Technical Adviser
American Institute of Bolt,
Nut and Rivet Mfrs.,
1550 Hanna Bldg.,
Cleveland 15

● The statement is based on confidential data received from a leading aircraft engine manufacturer. The principle involved is that since the rolled thread has a much smoother surface, it has a greater area of contact between the flanks of the thread on the stud and the corresponding flanks of the thread in the tapped hole. The cut thread, particularly in the hard materials being discussed, is so rough that there is contact only at the high spots. The situation is somewhat similar to that occurring in precision gage blocks where the surfaces are so smooth and flat that a certain degree of molecular adhesion actually takes place.—Ed.

FORGED RAILWAY WHEELS

Sir:

We understand that an article on the formation of railway wheels by forging may have appeared in THE IRON AGE during the last three months but are unable to trace it. If it did not appear in THE IRON AGE but in some other journal, could you let us know where it was published?

R. WHITFIELD,
Technical and Research Department
Incandescent Heat Co., Ltd.,
Cornwall Rd., Smethwick,
Birmingham, England

● It was not in The Iron Age and we have not been able to find it anywhere else.—Ed.

PERMASOL

Sir:

Who markets the coolant for machine tools that is known as Permasol?

R. D. WARREN,
Metallurgist
Crucible Steel Company of America,
Sanderson Works,
Syracuse, N. Y.

● E. F. Houghton & Co., 301 West Lehigh Ave., Philadelphia 33.—Ed.

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usually cost less at the point of assembly

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This simple shaped design requires close control of temperature and forging operations, because the entire section of this forging must be free of all concealed defects—sound throughout—to withstand unrelenting vibration and fatigue stresses.

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This Industrial Week . .

- **Complexion of Steel Orders Changing**
- **Rail Tonnage Seems Assured**
- **Locomotives To Go To French**

THE complexion of steel orders has changed considerably in the past few weeks and more changes are expected in the distribution picture during the first quarter of 1945.

Several months ago accent was on many war programs as far as steel supply was concerned, but now the spotlight shows brightly upon only one major war steel item—shell steel. It was apparent early this week that the increased shell program will not be at the expense of steel rails in the first quarter, but will gain its extra supplies from cutbacks in steel plate directives.

It is expected that shell steel production will increase about 5000 tons a month, starting in January with an indication that in May of next year shell steel demand will exceed monthly capacities for that item by some thousands of tons. It is quite possible that because of the rapid turn of events abroad, subsequent changes may be made in the various parts of the shell steel program. For this reason it is believed that any item which stands in the way of full and rapid shell steel output will definitely be sidetracked until such time as the Armed Forces are adequately supplied with their requirements.

Apparently a clear track has been definitely established for first quarter steel rail requirements which will total about 600,000 tons. It is expected that this tonnage will be supplied despite competition with shell steel for hot topping facilities. This will mean a step-up of present steel rail output levels.

While makers of shell steel and rails as well as structural steel see heavy orders ahead for early next year, this enthusiasm is not shared by some flat rolled producers who have lost and will lose additional steel plate tonnage. Some quarters in the sheet and strip business are becoming pessimistic about the future volume of sheet and strip orders. Heretofore as one contract was cancelled there have been two or three to take its place on the wide strip mills, but this is not the case in all areas now.

THIS pessimistic outlook on the part of some flat rolled makers may be premature since other areas indicate that pressure for sheet deliveries will now be shared by both hot and cold rolled sheets, whereas demand had been almost entirely for the former. Currently hot rolled sheets are somewhat easier to supply from an overall basis, but although one mill reports it has openings for January deliveries, another producer indicates schedules running through the first quarter of 1945. A sign that sheet deliveries are generally better may be found in the substantial decline in delivery complaints for this item.

Maritime Commission requirements, written off many times in the past only to rise again, appear to have finally and definitely hit the skids. Contracts rapidly nearing completion are not being renewed. Otherwise the war production picture is mixed with some contract reductions and cancellations and other ne commitments.

Cancellation by the Army of 634 of the 1226 Bail Bridges scheduled for 1945 output is offset by t Navy Bureau of Yards and Docks' award of 500 tw story barracks requiring 26,000 tons of structur steel to the U. S. Steel Export Co., sublet to the Ame can Bridge Co. Increases are noted in certain bo and armor piercing shot contracts which will invol tonnages of both carbon and alloy steels. A large ai craft engine manufacturer is placing steel requir ments for a few thousand additional units.

ON the export front it is said the War Produ tion Board will shortly issue letters of intent f production of 700 locomotives for use in France. T War Department and the WPB are expected to co fer soon and grant permission to go ahead with th order. The order for passenger and freight cars f French use has been held up. It is expected that t Baldwin Locomotive Works will build about 40 p cent of the French locomotives; the American Loc motive Co. a like amount, with the remaining 20 p cent expected to be produced by Lima Locomotive.

Advices from official French sources in this cou try last week indicates that France's industrial com back depends entirely upon the rehabilitation of i main railroad lines as well as interconnecting link Until such time as her transportation system is r stored, France's industrial cities including steel ce ters will make slow progress in regaining regular ou put. For this reason a green light on French pu chases may materialize sooner than is general expected.

The Brazilian Government Railways has ordered 2 box cars and 250 gondolas from American Car & Fou dry. American Steel Corp. of Cuba is inquiring f 30 18-ton and 500 to 1500 30-ton cane cars. Gre Northern is inquiring for 500 50-ton high tensile, lo alloy gondolas and 250 70-ton all-welded flat cars.

MOST scrap markets this week followed up la week's advances in price with further increase Some areas claim that prices are heading for the ce ing level. The IRON AGE steel scrap composite pri is up $1 a gross ton this week to $17.08 a gross ton.

Steel ingot production dropped half a point th week to 95 per cent of rated capacity. Pittsburgh o erations were down one point to 94 per cent, while i the Chicago district the operating rate decreased thr points to 96.5 per cent. Other districts showing a de cline in production were Detroit, down three to 97.5 Cincinnati, down six points to 98, and the Weste district, down six to 87.5. Philadelphia ingot outpu increased half a point to 96.5 and Cleveland regain nine points to 99 per cent. The Eastern district ha gained nine and a half points to 94.5. Youngstown a 93; Buffalo at 104.5; Birmingham at 94 and St. Lou at 92 5 per cent continued unchanged.

• **BATCHELLER ON .RECONVERSION**—"We must continue to produce for war until final and complete victory is won. We cannot let up for one moment and we cannot let the thoughts of reconversion hamper us in our desire to win the war. If it means that we have to wait a while before we can reconvert, I believe that you and I and everyone would rather have that victory than delay. When GI Joe comes home he wants a job. I want him to have one, so do you. He has earned his job by his brave actions in the past. He has risked his life to make our country secure. But at the same time, I would rather have a live GI Joe waiting three months than to have him lying in a slit trench, dead. Dead for lack of supplies, lack of shelter, lack of medicine, guns or ammunition."

• **MILITARY WIRE NEEDS HEAVY**—Order books of wire mills are filled with Army and Navy requirements for the remainder of 1944 and the first quarter of 1945, WPB has announced in pointing out that only an exceedingly small number of the more than 2,800,000 innerspring mattresses authorized for production by about 300 manufacturers in 1944 and 1945 under Priorities Regulation 25 (spot authorization procedure) can be completed in the near future.

• **POSTWAR CONSTRUCTION PREDICTION**—The greatest construction boom the United States has ever known; one that will last for five years, is a postwar certainty, Harry D. Watts, chairman of the board of James Stewart & Co., international engineers and contractors, said recently. "The American construction industry is ready to start work tomorrow," said Mr. Watts. "Schools, bank buildings, hospitals, and other institutions are on order throughout the country. Of the hundreds of war factories rushed to completion, a great many were built to last only five years and cannot handle postwar reconversion jobs. Many of them will have to be scrapped or entirely rebuilt. European demands for reconstruction are already felt here. A French delegation of seven is already in this country inquiring about port and harbor facilities," he said.

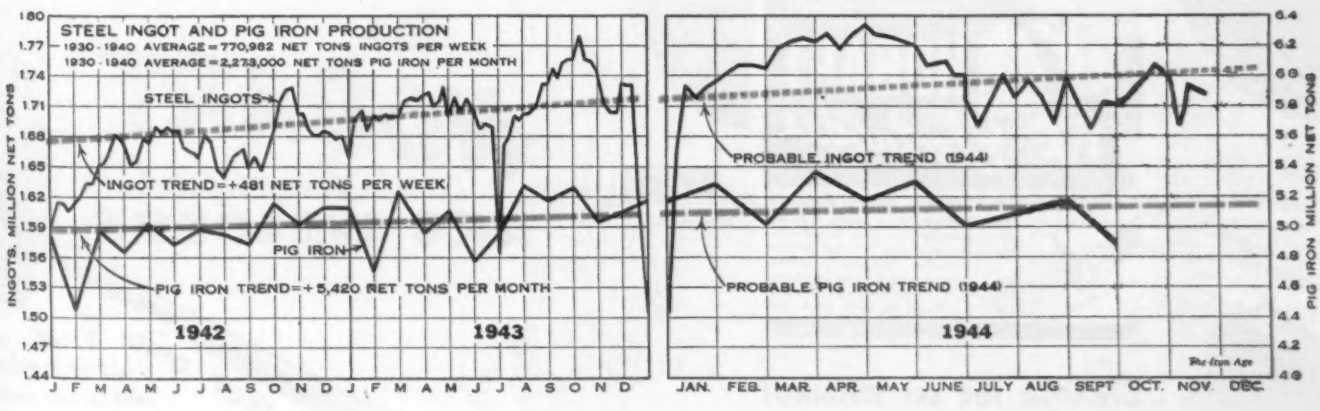
• **RETURNING VETERANS**—A total of 80,444 placements of veterans of the last war and the present war was made during September through offices of the United States Employment Service, according to Paul V. McNutt, chairman of the War Manpower Commission. This total includes 12,492 placements involving disabled veterans whose skills, aptitudes and experiences enable them to perform many types of productive work. Of the total number of jobs found during the month, 60,064 were for veterans of this war, Mr. McNutt said, and 10,892 of these were for servicemen with disabilities.

• **DIFFERING STANDARDS CAUSE TROUBLE**—William L. Batt, vice-chairman for International Supply of the WPB, disclosed recently that differing standards in the United States and Britain have already added at least $100,000,000 to the cost of the war and have caused incalculable production and repair delays. This statement was made at a meeting in the Engineering Auditorium held under the joint auspices of the American Society of Mechanical Engineers, the American Standards Association, and the Society of Automotive Engineers to report to American industry on the steps being taken to unify British and American practice with regard to manufacture of the threaded parts that keep our war equipment rolling toward Berlin and Tokyo. These include component parts of jeeps, tanks, trucks, gun carriages, gun parts, all kinds of instruments, and thousands of other items of essential war equipment. The technical problems involved include British American differences in screw threads, pipe threads, buttress threads, studs, instrument screw threads and similar items.

• **TUBING DEMAND UP**—Strong demand for cold drawn tubing has developed recently with one order having been placed over a five months' period at a high rate of production. Another order for this product has been entered calling for 1400 tons of tubing a month, with the duration indefinite. This type of business reflects another switch in military urgency.

• **EXODUS FROM WASHINGTON ABHORRED**—The homeward trek of many industrialists from the war agencies has the United States Chamber of Commerce concerned. The chamber which sees a great need for managerial strength in many government agencies wishes that there was a way to get businessmen of proved executive ability interested in staying on in Washington, or to get others to come and take their turn in helping the government.

• **MANAGEMENT TO BE MORE VOCAL**—More and more evidence is showing that in the coming years, management is going to become more vocal than it has been in the past. Some businessmen say that this is one of the great defects in management's strategy in getting along with labor, that it has not frequenty enough expressed itself in public. When businessmen speak privately of their problems and their desires to improve labor relations, they frankly admit that they are aware that one of the weakest link's in their policy is that they do not present a united front and do not speak in concert. While one industry may have one objective in dealing with labor, another industry has a quite different policy.


STEEL INGOT AND PIG IRON PRODUCTION
1930-1940 AVERAGE=770,982 NET TONS INGOTS PER WEEK
1930-1940 AVERAGE=2,273,000 NET TONS PIG IRON PER MONTH
STEEL INGOTS
INGOT TREND=+481 NET TONS PER WEEK
PIG IRON
PIG IRON TREND=+5,420 NET TONS PER MONTH
INGOTS, MILLION NET TONS
1942
1943
PROBABLE INGOT TREND (1944)
PROBABLE PIG IRON TREND (1944)
1944
PIG IRON MILLION NET TONS
J F M A M J J A S O N D J F M A M J J A S O N D
JAN. FEB. MAR. APR. MAY JUNE JULY AUG SEPT OCT. NOV. DEC.

Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
November 14	95.0	99.5	93.0	96.0	90.0	104.5	92.0	94.0	100.5	93.5	104.0	92.5	85.0	95.5
November 21	94.0	96.5	93.0	96.5	98.0	104.5	92.0	94.0	97.5	87.5	98.0	92.5	94.5	95.0

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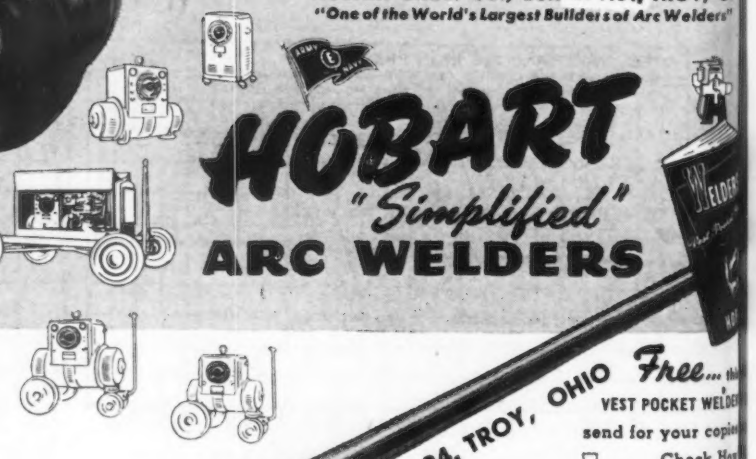

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Foreign Trade Needs World Economic Organization

. . By JACK HIGHT . .

Rye, N. Y.

• • • **In sessions lasting** more than a week the International Business Conference here discussed all phases of world trades and left after presenting reports that emphasized the necessity of a world organization empowered to act in the economic sphere as well as the diplomatic.

Discussions of each of the subjects on the program pointed up the fact that until governments have passed on their regulations, business men cannot accurately predict what the postwar trade situation will be.

This need for governments to intercede, points directly at the need for a world economic organization to complement a diplomatic organization. Such an organization could have additional values in ability to represent groups not well represented at the business conference.

Representatives of the major industries in most of the nations were represented in the conference, the make-up of the group and the sponsoring organizations tending to make the business conference representative of large industrial groups rather than of small businesses or agriculture regardless of their importance to any national economy. There were some notable exceptions to this, not including the United States.

Although other subjects were under discussion, the cartel question was largely the center of interest. Feeling was so strong here and abroad that it was reported that the British delegation had difficulty agreeing on a chairman, one group favoring free market competition throughout the world, and the rest feeling that the traditional English policy of world cartelization should be maintained and extended.

The result after a week's meeting in secret was a public statement which at least a moral victory for the cartel proponents, if not a total victory. The statement recognized the differences of opinion on the question, and went on record as favoring the good brought about by "trade accords," as one British delegate preferred to call them. It called on the governments of various nations to study agreements that could be made to the mutual benefit of all nations, stating that they "maintain and increase employment, further peaceful relations in trade, enable standards of living to be raised, and open and expand markets in an orderly and progressive manner." In the words of the report, "It is essential to preserve the benefits of such agreements, and to avoid their use in a manner which is contrary to the public interest of any nation."

This report was received with criticism from many sources, where the feeling was strong that world trade agreements had aided the Axis countries, and some quarters even asserted that certain representatives of neutral countries, through alleged cartels, may be even today speaking indirectly for the Axis business interests.

The sessions were carefully directed to avoid so far as possible political issues, and issues that would tend to be colored by political opinions, but certain delegations in statements were obviously operating with political intent. Despite efforts of the National Association of Mannfacturers, International and United States Chambers of Commerce, and the National Foreign Trades Council, sponsoring organizations, the Indian delegation particularly made its bid for public sympathy in this country, denouncing the cartel system that was subject of heated debate, both in and out of the formal sessions.

Countries not yet heavily industrialized, although largely outvoiced in official reports by industrial nations, voiced their criticism of the trend toward lowering tariff barriers in statements made as addenda to the regular reports. The Brazilian and Indian delegations stated that their positions as debtor nations made it essential that they protect foreign investments with tariff barriers. Their suggestion was that creditor nations should start the trend for lowering barriers, and that when developed industrially, other nations should follow.

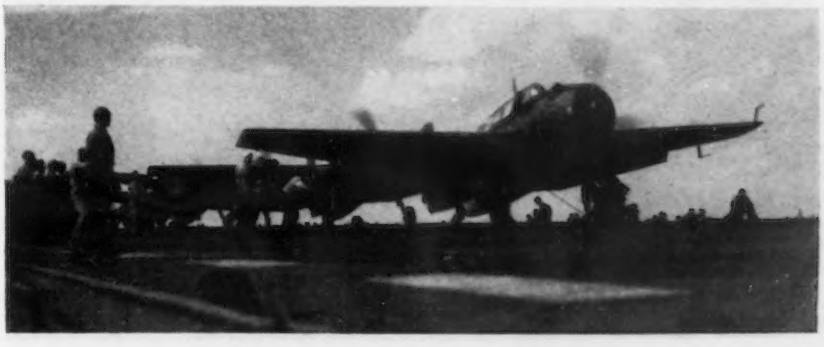
The business conference was a gathering of business men of fifty-one nations, with observers from Russia making a total attendance of fifty-two. Avowed purpose of the meeting was not to demand action or pass resolutions, but to allow business men of the several nations to exchange views and discuss problems of mutual interest.

Actually, after five years of war in which many contacts between nations had broken down for lack of transport and communications facilities, the delegates paid their own way to the conference to exchange ideas, and to find out just how far plans for postwar world trade have progressed.

The meetings afforded ample opportunity for the businesses represented to do this. The men present got the following feelings on the general trade picture: Some way would have to be prepared to get the British Empire back into the world trade, probably with certain articles of American manufacture, or at least with materials produced in this country.

Russia, whose "observers" represented the state capitalism of that country, is known to be seeking a wide variety of capital goods, to be paid for with raw materials yet to be developed in that country, while China needs almost anything that she can get from anyone.

BEFORE GOING DOWN: ***Damaged on October 23 and subsequently sunk in the Battle for the Philippines, the U. S. Navy light carrier USS Princeton strikes one of its last heavy blows against the Ryukyus Islands, only a few hundred miles from Japan.***



WPB and Industrialists Plumb Depths of Heavy Truck Difficulties

Detroit

• • • **Although heavy truck** production has increased 35 per cent since last June, output must be advanced sharply during the coming three months, War Production Board officials advised auto industry people here in a brass-tacks conference on forthcoming problems held recently.

Harold Boeschenstein, deputy vice-chairman for operations of WPB, told a panel that the Army is wearing out 900 trucks each week; that tire wear is higher than had been expected because of lack of experience with new types of tires plus the fact that trucks are operating off the highway and over rough coral; and that of $5,000,000,000 in war production monthly now being turned out, 20 per cent of it is on the critical list.

Individual manufacturers related their current problems in the round-table discussion. H. M. Coals, Autocar Co., said manpower was that firm's biggest problem today. E. J. Bush, Diamond T Motor Car Co., said the bank of engines in reserve was being used up, and that his concern needed more materials made available. J. C. Keplinger, Hercules Motors, said his plant was short of cylinder blocks, cylinder heads, water pumps, crankshafts and bearings, all of which were holding up engine production.

It was stated by John H. Middlekamp, director of the WPB Automotive Division, that no automotive engine manufacturer in the country was producing up to capacity, and that output could be increased were it not for the tight casting situation.

Reviewing castings output, C. W. Cannon of Campbell, Wyant & Cannon Foundry Co., big Muskegon, Mich., producer, said his plant was up to schedule in three foundries and short on only one casting, a camshaft. He entered an objection to inspection of castings, which he said was severe to the point that the number of scrapped pieces were holding up production. He indicated that manpower shortages—today about 150 men in the CWC shops—had become so commonplace that they were now taken for granted. Commenting on the foundry situation, Boeschenstein declared WPB has a 20 per cent deficit on motor blocks which cannot be placed due to lack of facilities. He said that because of these problems WPB was not interested in civilian production at this time.

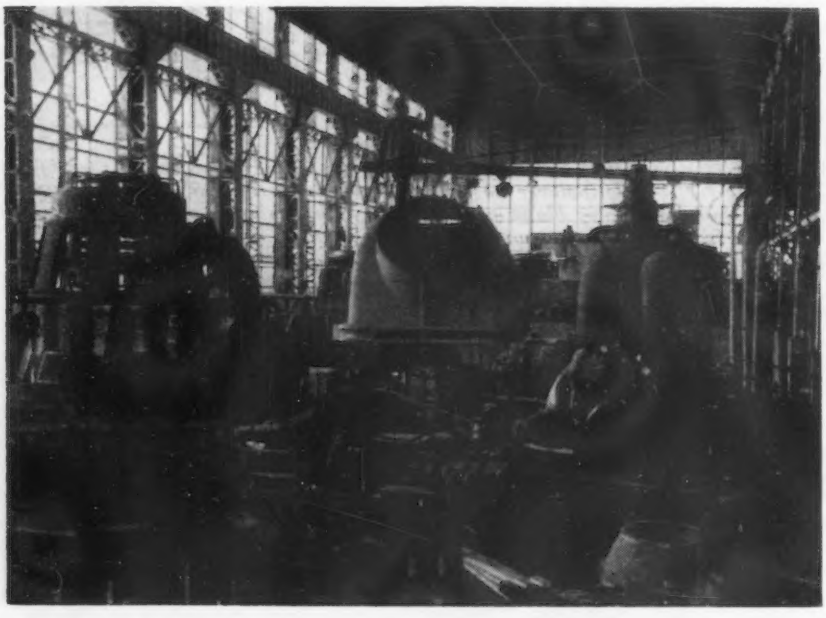
I. B. Babcock, president of General Motors Truck & Coach Division, asked that if new truck orders are going to be placed, they be handed out now to permit ample lead time for foundries. He was assured that further orders would be placed, but it was said that paper work had delayed the procurement services. Babcock, detailing his troubles, said that 700 workers have quit the division's plants at Pontiac and left the area, due to newspaper articles and rumors leading them to feel that the war's end was close at hand.

Axle housing shortages, a bad problem last summer, were generally reported improved from then, although the supply is far from free yet.

A session which followed dealing with machine tool problems brought out an observation from Boeschenstein that ammunition production, currently on schedule, must be nearly doubled during the next five months. Shortages hampering machine tool production for these and other requirements were said to be pumps and valves, with lack of castings at the root of the trouble. One four-way valve in particular was said to be holding up production.

Undersecretary of War Robert Patterson preceded the WPB meeting in Detroit, but his objective was the same—to step up critically needed production. He visited the Cross Gear & Machine Co., large producer of specialty machinery.

ON THE HOMEFRONT: *Skilled Japanese workmen carefully go over their mechanical creations. Since Japan is riding the crest of a formidable but significantly unpretentious national defense program, skilled labor is at a high premium.*



Curtiss Plane Plants Close for Inventory

Buffalo

• • • **Curtiss—Wright Corp.** Airplane Division plants in Buffalo, St. Louis and Louisville will halt production from the night shift on Dec. 23 until the morning shift of Jan. 2 to take and adjust inventories and to permit plant maintenance work.

"It was decided to take the inventories during the year-end period," a company statement said, "because it will interfere least with production.

"A stock of parts will be built up before the shutdown, so that the production loss during the inventory period may be overcome within 45 days after operations are resumed.

"Aside from the personnel who will aid in taking the inventories, this shutdown period will provide a holiday for many of the Airplane Division employees.

"All office employees (more than 4000) will report for work during the week, with the exception of Christmas and New Year's, when the plant will be closed except for routine maintenance."

Mead Senate Committee To Investigate Current Manpower Shortage

Washington

• • • **The Mead** (Senate) Committee will soon move into the manpower picture according to a statement made to Senators by James M. Mead, Democrat of New York and chairman of the committee. He expressed concern that it is possible for some war plants to be greatly in need of labor, while other plants are shut down and their labor cannot be utilized by the plants needing men because of a variance of skills.

Senator Mead made this statement just before OWMR Director James F. Byrnes announced on Nov. 16 that there is a shortage of 200,000 able-bodied men to iron out production lags in critical programs.

Director Byrnes also sent a letter to five agencies concerned, telling them that if the shortage is not soon overcome he would have to take drastic action and suspend the spot authorization plan in Groups I and II labor areas and possibly all new civilian production.

The critical programs cited by Mr. Byrnes' letter to the Army and Navy, WPB, Maritime and War Manpower Commissions are: Heavy bombers, artillery, trucks and tires, assault transports and cargo ships, repair and maintenance parts particularly for the fleet, cotton duck and radar equipment.

Mr. Byrnes said that none of the agencies should approve spot authorization in "localities where war production is lagging behind schedule because of a lack of labor."

Senator Harley M. Kilgore, Democrat of West Virginia, told THE IRON AGE that he has never thought that a manpower shortage has ever existed and declared that the present situation is a result of a misapplication of manpower on a tremendous scale. Senator Kilgore is a member of the Mead Committee. This opinion however, is at variance with those expressed by War Agencies.

The committee is not sold on the idea, it is reported, that if on the West Coast there is a shortage of labor, Middle Western or Eastern workers should be penalized by not being permitted to take a job in civilian industry because they do not want to go to the West Coast, or because they have no way of knowing that their skills are needed all the way across the country.

The committee is expected to utilize the joint report of WMC and the Bureau of Labor Statistics which shows that the labor force including the Armed Services is higher than it has been in the history of the country. Other BLS figures indicate that far from being a great deal of labor evaporation in munitions industries in a desire to get civilian jobs, the quit rate in munitions industries and all other manufacturing is just about equal.

The report says: "In some specific segments of munitions programs, manpower problems continue to be serious. With the exception of foundries many of the production bottlenecks have arisen not because of labor shortages, but because of schedules stepped up at too rapid a rate, as for example in heavy field artillery and ammunition. Some of the so-called labor bottlenecks were actually caused by frequent changes in design such as in airborne radar which made it impossible to attain desired schedule."

Although the Mead Committee has in the past recommended spot authorization, they never recommended that it be placed in areas where labor is tight. The committee investigations may recommend the junking of spot authorization if it is discovered nothing can be done to get workers into the jobs where they are needed, but present indications are that the needed workers can be put in war jobs by better labor utilization, and greatly intensified recruitment.

The spot authorization plan has resulted in WPB approval of only about $80,000,000 in new civilian production and in the allotment of only about 30,000 tons of steel. Putting a damper upon the increase of civilian output will only serve to drive employees into service industries because contract cutbacks are not released with new contracts or permission to renew civilian production, WPB officials say. In support of this assumption they say that the joint report shows that while employment in the munitions industries dropped 1,060,000 between November, 1943, and August, service industries such as beauty and barber shops and restaurants increased their employment by 504,000.

Transportation Repair Rules Issued by WPB

Washington

• • • **WPB recently issued** Direction 6 to P-142 barring transportation system operators from using the blanket authorization to purchase certain repair parts for diesel electric locomotives of 660 hp. or larger. WPB said that to obtain diesel engines, complete truck assemblies, propulsion motors and generators for repair or reconstruction, operators must apply for a rating on Form 541.

TEMPORARY HUTS: *The first street of huts in London erected on a blitzed area which has been cleared, is practically ready for occupation. New tenants are expected to occupy them in the near future.*

Industry Committee Advises Retention Of Steel Controls

Washington

• • • **Members of the** WPB Carbon Bar and Semi-Finished Steel Industry Advisory Committee at a meeting recently unanimously recommended that warehouse load directives on hot rolled carbon steel bars and semi-finished steel be retained until V-E Day, with the modification, however, that the ceiling on quantities of materials that can be ordered be removed.

It was contended that a more flexible flow in distribution of material from mill to warehouse would result if the purchaser were not held to a maximum limit. Committee members expressed the belief that the provision in the directive on the minimum tonnage space that mills must reserve for warehouse orders will have to be retained if warehouses are to be assured of a sufficient supply of material.

Warehouse directives provide that steel mills must reserve tonnage space for warehouse orders regardless of their other orders.

The Committee also recommended the continuance of further conversion allocations of bars and semi-finished steel and of the lead time of 45 days between scheduling and production. Reversion to the 30-day lead time, it was claimed, would upset mill schedules.

Confirming an earlier announcement published in THE IRON AGE government officials reported that all lend-lease orders for carbon bars and semi-finished steel for the United Kingdom that are not shipped by Dec. 1 will be canceled. It was also stated that no orders for these products are expected to be placed during the first quarter of 1945.

Electric Output Drops

Cleveland

• • • **Output of electricity** by the Cleveland Electric Illuminating Co., serving a large industrial area along Lake Erie from plants at Cleveland and Ashtabula, has dropped below a year ago during each of the past four weeks. Believed to indicate a downward trend in wartime industrial operations, the decline has spread from 1.3 per cent to 4.2 per cent. Decline in the week ending Oct. 19 was the first from a year before in six straight years.

Aluminum May Ease Steel Requirements For Office Supplies

Washington

• • • **The possibility** of using aluminum for office supplies will be explored, members of the newly organized Office Supplies Manufacturers' Industry Advisory Committee told WPB officials at a recent meeting.

In a discussion of iron and steel requirements, makers of office supplies who wish to exceed quotas established under L-73 were advised by WPB officials to apply for permission under Priorities Regulation 25, the "spot authorization" procedure. It was also suggested that office supply makers might be able to obtain materials from idle and excess inventories under Priorities Regulation 13. Some committee members reported success in obtaining idle and excess materials suitable for the production of office supplies. Others reported difficulty in obtaining such material in needed sizes and gages.

The WPB plan for relaxing controls on "V-E" Day was outlined by WPB representatives: (1) removal of controls over as many materials as possible, (2) assistance in making materials and labor not needed for war production available for civilian production and (3) retention of one preference rating for direct military production and the AAA rating for emergency use in connection with either military or civilian programs.

Bell White Collar Workers Get Hours Cut

Buffalo

• • • **Bell Aircraft Corp.** officials announced that, effective Nov. 20, the work week of approximately 5000 "non-production" employees of the company's Buffalo and Niagara Falls plants will be reduced from 48 to 44 hours.

Joseph D. Canty, area director of the War Manpower Commission, in granting the Bell plants exemption from the mandatory 48-hr. week, said employees affected will be clerical, office and administrative and that the cut in hours will not interfere with war output.

A company spokesman said the Bell plants will operate as usual on Thanksgiving Day.

Non-Ferrous Founders Focus Attention Upon Cost Accounting Data

Chicago

• • • **Non-Ferrous founders** are becoming keenly interested in the most modern methods of cost accumulation factors, as evidenced by the session on this subject at the recent board of directors meeting of the Non-Ferrous Founders' Society, held in Columbus, Ohio.

L. M. Nesselbush, of the Falcon Bronze Co., Youngstown, Ohio, a director of the society and chairman of the Cost Committee, presented for discussion the preliminary accounting manual being prepared for the membership. As he explained, the purpose is to "provide the society members with what the committee has found to be the minimum requirement for (a) general accounting principles that must be followed and (b) cost finding methods to be employed."

The preliminary portions of the manual have been developed in order to attain the industry's maximum contribution to the war effort, to provide the data essential for better controls and profitable operations in the post-war period.

It is planned to have the second section of the manual, covering labor, materials, expenses and burden, in shape for final discussion at the next meeting in Philadelphia, the middle of January. After final approval by the Cost Committee and the board of directors, the complete program will be made available to the membership.

Another long needed "tool or measuring stick" for use by the non-ferrous industry is a code of standard trade practices, with recognition of all the factors that govern foundry operation. Under the leadership of C. H. Stokesbury, Derby Castings Co., Seymour, Conn., a proposed recommended standard trade customs has been gradually developed. At the Columbus meeting, the board reviewed both the original material and all suggested revisions, finally approving the combined form.

Speakers at the two-day meeting included Roy M. Jacobs, Milwaukee, president; Edwin W. Horlebein, Baltimore, vice-president; Joseph Meier of the OPA, Washington, D. C., Thos. S. Hemenway, Buffalo, and L. M. Nesselbush who presided as chairman.

Cleveland Artillery Shell Program Upped As Need Increases

Cleveland

• • • **Calling on plants** in this area to "produce to the utmost," Col. E. A. Lynn, Chief of the Cleveland Ordnance District, disclosed this week that the artillery ammunition production quota in the district had been boosted 35 per cent because "our troops are using ammunition faster than it is being produced."

Coinciding with the recent statement that General Eisenhower's forces alone required 3600 tons of artillery ammunition a day for adequate support, Colonel Lynn said that main increases in this district must come from the following plants:

Eight-inch shell, Struthers Wells Co., Titusville, Pa.; 105-mm. shell and cartridge cases, Bishop & Babcock Mfg. Co., and Yoder Co., Cleveland; J. A. Zurn Co., Erie, Pa.; Apex Electrical Mfg. Co., Sandusky; Mullins Mfg. Co., Salem and Warren, Ohio; 155-mm. shell, Willys-Overland, Toledo; fuses and boosters, Talon, Inc., Meadville, Pa.; Hoover Co., North Canton; Electric Autolite Co., Toledo, and Parker Appliance Co. and Weatherhead Co., Cleveland; mortar shell (60 and 81 mm.), Gabriel Co., Ferro Machine and Foundry Co., Apex Electric Co., Chase Brass & Copper Co., Emanuel Products Co., all of Cleveland, and the Warren plant of the Mullins Mfg. Co.

Production of artillery ammunition in the United States has tripled since the beginning of 1944, and stiffened enemy resistance requiring increased artillery action has resulted in a tremendous drain on reserves, Colonel Lynn asserted.

With current munitions requirements reaching $6,000,000,000 a month, a volume never before attained, war industry employment in this three-state region fell off 40,000 in September alone, and approximately half that number are urgently needed male workers.

Supply contractors for Ordnance alone, through September, 1944, totaled $3,988,809,000 in Ohio, and of this, $1,075,500,000 were awarded in Cleveland. And according to Colonel Lynn, the number of contracts previously expected to be terminated on V-E Day has been revised and cut 50 per cent.

With this came the announcement from the local WMC that 54 per cent of the major war plants in the Ohio-Michigan-Kentucky region lagged behind production because of labor shortages. Sagging more than 150,000 below the peak reached last November, total employment in these plants touched a low far beyond that attributed to the relatively few cutbacks in the armament program, since Jan. 1 at the yearly rate of more than $28,000,000,000.

Batcheller Assails Reconversion News

Pittsburgh

• • • Speaking here recently Hiland Batcheller, WPB operation head said: "Reconversion seems to be the topic of the day. War production is no longer news. It has ceased to excite our people. It is relegated to the inside pages. However, as Mr. Whoosis gets a permit to resume the production of mouse traps or cocktail shakers, that makes the front page and that is going too far.

"We must realize, however, that there is such a thing as reconversion. It is silly to attempt to pass over the necessity for minimizing to the greatest extent possible, the reconversion of our industry from war production to peace production at the proper time. The error comes in trying to beat the gun and not anticipating the time at which specifically reconversion of industry and resumption of civilian production can be undertaken. We know GI Joe wants a job, we know some billions of dollars are needed to support our national economy; we know additional jobs must be provided, more than we ever had in any other war years if we are to achieve that achievement and preserve our American way of life as we wish to have it preserved. The error comes in trying to anticipate that and attempting to do that job, resume the production of civilian products unessential, for which there is no real suffering in this country, at the expense of the war and if we do that, it means only one thing, it means lives will be lost.

"So I say, let's stop talking about it prematurely; go as far as we can in planning and taking steps that can reasonably be taken without interference with war, but if anyone wants to interfere with the war by doing it prematurely, I say he is on the wrong track."

Revision of Mining Machinery Controls Recommended to WPB

Washington

• • • **Because of uncertainties,** which they said are likely to prevail after V-E Day, members of the WPB Mining Machinery Manufacturers' Industry Advisory Committee at a meeting recently recommended that present controls on mining machinery (Orders P-56 and 269) be maintained. However, P-56, establishing procedures for producers to obtain maintenance, repair and operating supplies for mining and other mining equipment, was considered for possible abolition after V-E Day.

Order L-269 establishes control of production and delivery of items under List A, which now contains both critical and less critical items. A suggested revision would establish a List B of less critical items such as crushers, mine lamps, grinding machinery, ore dressing and coal preparation equipment. The committee said that this would facilitate the future application of production and delivery controls under the order. Furthermore, it was pointed out, foreign purchasers would be scheduled and required to obtain WPB authorization before obtaining $5,000 worth or more of machinery parts in any one month. Under the revised L-269 domestic mines would be permitted to purchase repair parts, which are critical items, without authorization.

Committee members said that customers are not purchasing and stocking mining equipment and parts beyond their requirements.

Packard Shipment Up 70% Over Last Year

Detroit

• • • **A nine month's volume** of war work exceeding the dollar output of the entire year 1943, has yielded Packard Motor Car Co.'s net income of $3,280,130 for the period ending Sept. 30, compared with $3,049,273, for the same period last year.

Business done totaled $354,503,682; 44½ per cent greater than the $245,312,429 for 1943's first nine months.

January - through - September shipments of Packard-built Rolls-Royce engines for Mustangs, Mosquitos and other Allied fighting craft, and Packard marine engines which power Navy PT boats were 70 per cent ahead of last year, it was reported.

War Wear on Foundry Electric Furnaces Makes Renovation Necessary

Pittsburgh

• • • **Foundries and steel** producers who do not have electric furnace capacity appear to be the only sizable purchasers of electric steelmaking equipment after the war. From the founders' standpoint, equipment purchases will have to be made to replace that which is antiquated or worn out because of incessant use during the past four years.

The use of the electric furnace in the foundry is, of course, a universally accepted practice, but many of these furnaces are 15 years or older, with old style units as well as electrical controls. A general renovation of the foundry electric melting facilities is expected as quickly as the war is over and such items can be obtained without government approvals or restrictions.

The electric steel furnace used in the foundry is necessarily small. Furnaces of 1000 lb. and 2 ton capacity are not at all unusual, while the bulk of these units is in the two to five ton range. Larger foundries can utilize larger units in the 10 to 20 ton range, and only a few foundry operators can use equipment in the larger ranges. Since foundry operations usually required that all metal melted be utilized in a finished cast product, there is little need for large size furnaces.

The second market, the present non-electric steel ingot producers, companies like Inland Steel, Jones & Laughlin, Wheeling, and National, to name a few, might be forced competitively into the electric steel business. Despite the fact that presently only about 75 per cent of the nation's present electric furnace capacity of 5,350,880 net tons is being utilized, non-electric steel ingot producers might well find themselves in a position that tends in some ways to parallel flat rolled products producers at the advent of the continuous strip mill.

The bulk of the new electric furnace steelmaking capacity that has been added in the past four years is government owned through the Defense Plant Corp. Typical units is the plant operated by Republic at Chicago and that built for Andrews Steel at Covington but later taken over by DPC. While large portions of DPC built electric furnace plants are not in operation and, incidentally, some parts have never been in operation, it is expected that the steel company operators will take over the plants as soon as DPC works out disposal details.

No Relaxation in Tin For Hardware Industry

Washington

• • • **Members of the WPB** Hardware Industry Advisory Committee were informed at their meeting here that no relaxation of restrictions on the use of tin in the manufacture of hardware is possible in the near future.

A WPB official pointed out that the maximum of 2 per cent in tin bronzes, now permitted in the production of hardware under Order M-43, makes satisfactory castings in most cases. He added that silicon and manganese may be used in hardware manufacture and aluminum and zinc die castings may be possible substitutes for many bronze applications.

Nickel is expected to remain in short supply due to heavy military demand, a representative of the Steel Division, Nickel Section stated. There is little probability that restrictions on nickel plating for hardware can be relaxed in the immediate future, though the amount of nickel required for this purpose is small in proportion to total nickel production, the official said.

He declared that the overall supply situation for malleable iron is critical. Civilian requirements far exceed the quantities available. Though relatively small amounts of malleable iron are used in the manufacture of hardware, the general supply situation makes it impossible to meet demands fully, for malleable iron for civilian hardware.

Contract Settlements Concern of ATSC Head

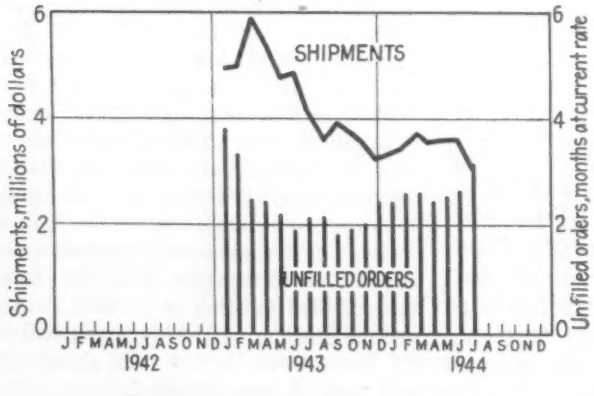
Dayton

• • • **"Next to winning** the war, contract settlements will be the greatest job America has ever faced," Lieut. Gen. William S. Knudsen, director of the Air Technical Service Command, said recently at Wright Field.

Expressing concern over "possible public apathy" in the coming months over contract settlements, upon which depend the history of the nation for the next 20 years and the future happiness of the next two generations, General Knudsen asserted that labor will have to understand that there will be some unemployment when production is cut back.

Management must realize the necessity for prompt presentation of bills to the government, said General Knudsen. "It is a curious fact that we have thousands of contractors and sub-contractors who are not asking for their money."

Discussing the problem of war surplus disposal, General Knudsen stated that a large percentage of war equipment will have to be scrapped.


SHIPMENTS
UNFILLED ORDERS
Shipments, millions of dollars
Unfilled orders, months at current rate
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J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1942
1943
1944

FOUNDRY EQUIPMENT AND SUPPLIES: *Monthly shipments and unfilled orders as compiled by WPB Tools Division. While the trend in shipments is downward some leveling off in the descent has been noted recently.*

Timken Selects Canada

Canton, Ohio

• • • **Officials of the** Timken Roller Bearing Co. have announced the selection of St. Thomas, Ont., as a site for a bearing and rock bit manufacturing plant to employ about 300 workers. Established to meet an increased demand for bearings and rock bits in the Dominion, the site is located just across the border and northeast of Detroit and is considered a central location for Timken's Canadian markets.

Vinson Promises Extra Vigilance For Preventing Cost of Living Rise

Washington

• • • **Economic Stabilizer** Fred M. Vinson on Nov. 19 pledged special vigilance by the government to hold the current "disturbing" rise in the cost of living in a statement that was viewed by officials here as confirmation of the general belief that no general wage adjustment will be allowed until X-Day.

Mr. Vinson's new "hold the line" attitude followed by a day issuance of the cost of living report by WLB Chairman William H. Davis, which reported a 29 to 30 per cent rise in living costs since January, 1941.

CIO President Philip Murray's attack on WLB for failure to recommend puncture of the Little Steel Formula was regarded by labor sources as additional evidence of the government's intention to hold up wage adjustments until after X-Day. At the CIO convention on Nov. 20 Mr. Murray accused the Board of complete evasion of responsibility in the steel worker's wage case.

Conflicting opinion was expressed by members of Congress of whether Chairman Davis's report on the cost of living means a general wage increase is on the way. It was pointed out that before the creation of the Little Steel Formula the cost of living was said to have jumped 15 per cent between January, 941, and May, 1942, and that recognition by the government of an additional 15 per cent rise provides a basis for another general adjustment. However, it is generally believed that if Mr. Vinson's injunction to hold prices down is followed, it would be inconceivable that wages were about to be increased across the board immediately.

However, Mr. Vinson held out hope for higher wages after X-Day when overtime payments disappear by calling for a post-X-Day wage policy "to provide workers with earnings high enough to buy the products of our expanded and reconverted industries."

The Economic Stabilizer described the Davis report as "a careful, thorough, and disinterested survey of the subject." The report held out some hope of an adjustment for lower bracket employees before X-Day. Also it has been pointed out that the Vinson report while apparently opposing an immediate general wage increase does not necessarily block concessions in the steel wage case such as setting up shift differential and upgrading of some classes of workers.

Senator Claude Pepper, Democrat of Florida, has proposed a wage floor of 65c. an hr. and if his bill is passed some observers see wage increases all along the line resulting from elimination by WLB of inequities within the formula.

The "disturbing" rise referred to by Mr. Vinson occurred this year when BLS recorded an increase of almost 2 per cent in the cost of living, for a BLS total of 25.5 per cent since January, 1941.

The Davis report added 3 to 4 per cent to the BLS figure representing hidden increases in the sellers market to make a total rise of 29 to 30 per cent, contradicting the Meany-Thomas report of an 43.5 increase which was supported by CIO in its argument before WLB.

Additional Controls Lifted by Agencies As Supplies Expand

Washington

• • • **Continuing the program** of lifting all controls as soon as supply situations permit, controls have been lifted on purchases of copper, steel and cast iron pipe by the WPB, and on surplus stocks of critical materials held by petroleum operators by the PAW.

Improvement in supplies of copper, steel and cast iron pipe is given by WPB as the reason for lifting restrictions on purchases by power, gas and water utilities contained in Utilities Order U-1 and for amending Utilities Orders U-1-d and U-1-f and Housing Utilities Standards. The latter amendments permit a more general use of copper tubing for underground water and gas service lines.

Restrictions on the length of extension of gas, water and central steam heating service also were removed.

Edward Falck, director of the WPB Office of War Utilities, called attention to the fact that deliveries of gas for space heating purposes are still restricted in certain areas and that these restrictions are not affected by relaxations in the U-1 supplementary orders.

Deputy Petroleum Administrator Ralph K. Davies has announced that petroleum operators are no longer required to report surplus stocks of any critical materials except for tubular goods. Further relaxation of the control of critical materials was effected by amending PAW Materials Program No. 2.

operation of petroleum operators."

Mr. Davies explained that it will be necessary to report surplus stocks of tubular goods when the surplus, at an individual location or stockpile, is in excess of 100 ft. of casing, or pipe from 2 in. to 8 in. in internal diameter or in excess of 500 ft. of tubular goods over 8 in. in diameter.

Meanwhile WPB has amended CMP Regulation 9A so as to permit distributers of all petroleum equipment except that for the refining industry to obtain copper tubing to sell repairmen in repairing this equipment.

LAKES TO SEAS: *K-205, the Poinsett, is one of a fleet of the largest ocean-going vessels ever built on the Great Lakes. This ship was built by the U. S. Maritime Commission in the Leathem D. Smith Shipyard at Sturgeon Bay, Wis. It weighs about 2400 tons and has a capacity of 4000 tons.*

Stainless Steel Firms Indicted on Charge Of Fixing Steel Prices

Washington

• • • **Attorney General Biddle** has announced that 18 steel corporations and six of their officers were indicted in Trenton, N. J., on Nov. 15, on charges that ever since 1934 they had engaged "in an unlawful conspiracy arbitrarily to fix and maintain uniform and non-competitive prices, terms and conditions for the sale of stainless steel finished products sold in the United States."

Conviction would involve a maximum penalty of $5,000 fine and one year's imprisonment in each of two anti-trust charges.

Named as defendants were the following:

Allegheny Ludlum Steel Corp., Brackenridge, Pa., and Russell M. Allen, Pittsburgh, vice-president.

Carnegie-Illinois Steel Corp., Pittsburgh, and Paul F. Voight, Jr., Pittsburgh, manager, Stainless Steel Division.

Carpenter Steel Co., Reading, Pa., and J. Heber Parker, Reading, president.

Crucible Steel Company of America, New York, and R. E. Christie, New York, vice-president.

Republic Steel Corp., Cleveland, and Martin H. Schmid, Cleveland, manager of sales, Alloy Sales division.

Eastern Stainless Steel Corp., Baltimore, and T. F. McLaughlin, Baltimore, president.

Rustless Iron and Steel Corp., Baltimore.

American Rolling Mill Co., Middletown, Ohio.

Bethlehem Steel Co., Bethlehem, Pa.

Sharon Steel Corp., Sharon, Pa.

Firth Sterling Steel Co., McKeesport, Pa.

Jessop Steel Co., Washington, Pa.

Latrobe Electric Steel Co., Latrobe, Pa.

Midvale Co., Philadelphia.

Pittsburgh Steel Co., Pittsburgh.

Superior Steel Corp., Carnegie, Pa.

Timken Roller Bearing Co., Canton, Ohio.

Universal-Cyclops Steel Corp., Bridgeville, Pa.

The announcement said that the Chemical Foundation, Inc., the Nirosta Corp., both of New York, and certain predecessor companies of the defendants, were named as co-conspirators.

The Department of Justice said the Chemical Foundation was organized about 1919 to hold and license patents acquired from the Alien Property Custodian, and that it owned and licensed patents relating to chrome nickel stainless steel.

The Nirosta Corporation, also referred to by the Department as Krupp Nirosta, was described as having been formed about 1928 by Friedrich Krupp of Essen, Germany, the Ludlum Steel Co., Crucible Steel and others, "to exploit Krupp patents issued after the first World War and relating mainly to heat treatment of chrome nickel stainless steel."

The indictment alleged that gross sales of stainless steel finished products in the United States in 1942 were about $175,000,000, and that the defendant companies produced and sold more than 90 per cent of that amount; also that in 1934 the defendants and co-conspirators decided to make use of Chemical Foundation patents and to agree upon prices.

o o o

Chemical Foundation Denies Implications In Government Charge

New York

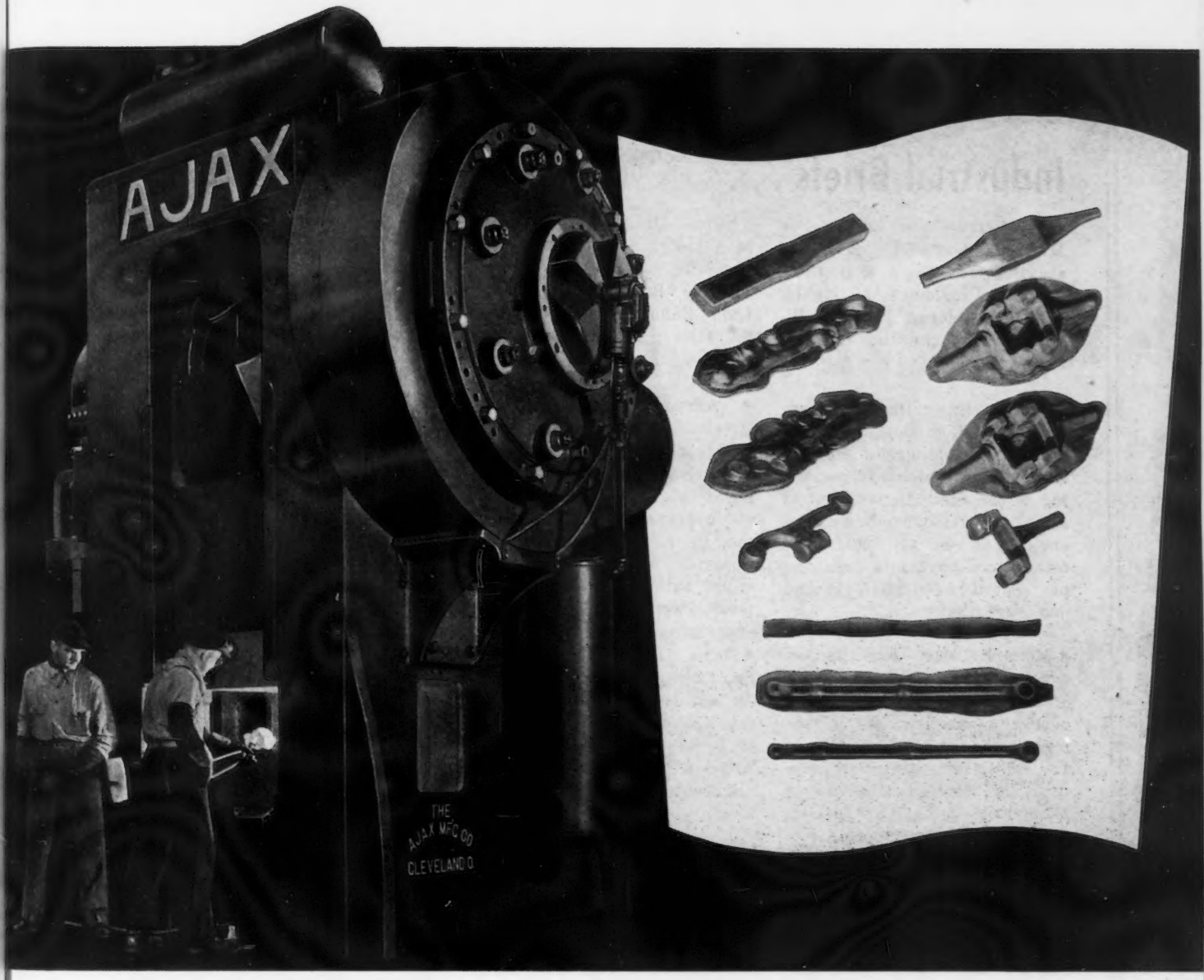
• • • **The implications inherent** in the use of the term "co-conspirator" with reference to The Chemical Foundation, Inc., in the recent indictment by the Federal Grand Jury in Trenton, N. J., of 18 steel companies and six of their officers are both unjust and unwarranted, the Foundation has charged.

The Chemical Foundation licensed over 90 steel companies to use its patents on stainless steel, it claims. These patents were available to all American companies on a non-exclusive and equal basis it was said. All of these licenses expired with the patents themselves in May of 1937, the Foundation says. Since that time, The Chemical Foundation argues that it has had no knowledge of, and no control over, the actions of any steel companies in the United States or elsewhere. Therefore, it claims it is not possible that The Chemical Foundation had any part in any alleged conspiracy which might be the subject of a present indictment.

During the period from July 1, 1934, to May 4, 1937, The Chemical Foundation did establish minimum prices on those types of steel covered by its patents it was said. Its action in so doing was legal in every sense and in complete accord with the decisions of the United States Supreme Court, the Foundation claims.

The prices fixed by The Chemical Foundation were based on actual costs of production and represented what was believed to be a fair price to the public which would at the same time give a fair return to the producer, the Foundation statement says. This belief is confirmed by the fact that in establishing prices, the Office of Price Administration in its release No. 636 of September 2, 1942, stated that it adopted for certain types of high alloy steel castings the base schedules used by The Chemical Foundation as the basis for minimum prices under its licensing agreements, according to the Foundation. The OPA also adopted price differentials established by The Chemical Foundation where the producer himself had no such established price differential, it was said.

PIECEMEAL TRANSPORTATION: *Chinese coolies carry parts of an American lend-lease jeep over a mountain in China toward the Burma Road, where the vehicle will be reassembled.*



The Advantages of High-Speed Forging During War Production

Points the Way to Production Advantages for Post-War

★ The production of press forgings for war materiel in such tremendous volume and to such exacting specifications as to enable that materiel to withstand the severity of war service has proven, through these years of intensive production and rigorous use, the superiority of Press forging over older, slower and less accurate methods.

Ajax High-Speed Solid Frame Forging Presses have demonstrated so many advantages in the high production of forgings, both hot and cold, and coining to such a high degree of economy and accuracy, that their important place in the production of forgings for the highly competitive peace-time markets is obvious.

Those operators of production forging equipment who have installed these modern, accurate, dependable high-production, Presses, and become thoroughly familiar with their great production capabilities, will be in an enviable position in post-war competition.

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WRITE FOR BULLETIN No. 75
to Post Yourself on the Advantages of High-Speed Press Forging

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Industrial Briefs . . .

• ACQUISITION — Taft - Peirce Mfg. Co., Woonsocket, R. I., has acquired from the J. & H. Electric Co., Providence, all rights, title, and interest in D. & W. Magnetic Chucks and J. & H. Demagnetizers.

• EMPLOYMENT DROP—According to the combined reports from a sample group of 6816 Illinois establishments reporting to the State Department of Labor, employment declined one-half of one per cent, while total wage payments rose one per cent between mid-July and mid-August.

• MORE RECORDS—For the second straight month, the Colorado Fuel & Iron Corp. open hearth department set a new ingot record, with production of 120,706 net tons in October, topping the September record of 115,680 net tons. Blast furnace A also set a new monthly record with 19,740 net tons, as compared to the previous top of 19,347 net tons in April.

• OPENS PLANT—Hercules Electric & Mfg. Corp. have announced that they are now located in their new plant and offices at 2500 Atlantic Avenue, Brooklyn.

• MAJOR EXPANSION—B. F. Goodrich Co. have expanded the plant and manufacturing facilities of their Clarksville, Tenn., Division.

• MOVED OFFICE — Wickwire Spencer Steel Co. have moved the general sales offices of the Springs and Formed Wire Division of the Automotive Division to New Bond Street, Worcester, Mass.

• NEW PLANT—Arcturus Mfg. Corp. has opened a new forge plant in Santa Monica, Cal.

• NEW LOCATION—E. C. Atkins & Co. have moved their New York offices to 233 Broadway.

• CANADIAN PLANT — St. Thomas, Ont., will be the site of a new bearing and rock bit plant to be operated by the Timken Roller Bearing Co., Ltd., Canadian subsidiary of the Timken Roller Bearing Co., Canton, Ohio.

• APPROVES CONSTRUCTION—Brecksville, Ohio, residents, by a vote close enough to require a recount, approved the proposed construction of a $1,500,000 experimental laboratory by the B. F. Goodrich Co., but Goodrich officials stated they might withdraw unless election results were decisive.

• BUYS FACILITIES—Caine Steel Co., Chicago, in order to expand its services to Western industry, has purchased the facilities of Pennsylvania Steel Co., Los Angeles. Marshall Wais, vice-president of Caine, will supervise.

• POSTWAR HOPES—The LeRoi Co., through its subsidiary, Lister-Blackstone, Inc., both in Milwaukee, intends to maintain, if possible, its postwar sales at a $10,000,000 a year level, about double the prewar average.

• CHANGES NAME—The corporate name of Pittsburgh Coke & Iron Co., Pittsburgh. has been changed to Pittsburgh Coke & Chemical Co.

• TRIUMVIRATE—The use of aircraft technology, materials, skills and tools for postwar housing has been announced in a joint statement made by Beech Aircraft Corp., Dymaxion Dwelling Machines, Inc., and the International Association of Machinists in Wichita, Kan. The prototype of the new house is now under construction at the Beech plant.

• CHANGING LOCATION—Dresser Industries, Inc., plans to move its headquarters from Bradford, Pa., to Cleveland. Executive offices will be located there in the Terminal Tower.

Warehouse Association Approves New Chapter

Cleveland

• • • **Establishment of an** Intermountain Chapter has been approved by the directors of the Amercian Steel Warehouse Association, Inc., W. S. Doxsey, president, Cleveland, announced. The territory of the new chapter includes the State of Utah and parts of Idaho, Nevada and Wyoming. Members of the chapter are:

The Galigher Co., Salt Lake City; Industrial Steel Co., South, Salt Lake City; The Mine & Smelter Supply Co., South, Salt Lake City; Ogden Iron Works Co., Ogden, Utah; Salt Lake Hardware Co., Boise, Idaho and Salt Lake City; Steel-Engineers Co., Salt Lake City; Strevell-Paterson Hardware Co., Salt Lake City; Structural Steel & Forge Co., Salt Lake City, and Z.C.M.I. Wholesale Hardware Division, Salt Lake City.

H. P. Lambrecht, Salt Lake Hardware Co., is president of the newly established chapter; S. S. Taylor, The Galigher Co., vice-president, and H. C. Kimball, Z.C.M.I. Wholesale Hardware Division, secretary-treasurer. Mr. Lambrecht is also Chapter Director.

Bendix Workers Trained In Basic Electronics

Elmira, N. Y.

• • • **Weekly classes in introductory** electronics for both day and night shifts have been opened at Eclipse Machine division of Bendix Aviation Corp. here. The company has introduced electronic devices in several revolutionary manufacturing and inspection processes.

"We are not attempting to teach grinders, inspectors and machinists the science of electronics," explained Ted K. Riggen, electronics engineer, who conducts the course, "or turn laymen into electronics engineers. However, these workers find it necessary to understand the language of electronics in order to operate and maintain the new equipment we have introduced to speed war production."

Enrolled for the first "semester" are employees from nine manufacturing departments, including the fuze assembly section, where accuracy of the Eclipse mechanical time fuze for shells is tested by "light-beam" dynamic regulators, an electronic device introduced here.

STANDARD GLASS-RUN WINDOW CHANNEL

The Standard Products Company, world's largest manufacturer of Glass-Run Window Channel, has available for immediate delivery complete stocks of window channel, bat wings and contour weather strip for replacement service. These products are for use in passenger cars, truck cabs, busses, taxicabs, trailers, motor boats, airplane cabins and streamlined trains.

Standard Glass-Run Window Channel is constructed with a rubber-covered steel cord, durable woven fabric lining and exposed edges. Full felt bottom for curved or straight windows. Requires no attachments. Rubber-covered back eliminates noise and rattles. Special designs—our laboratory and engineering departments are equipped to design and produce Glass-Run Window Channel for special jobs. Forward necessary details and our engineers will submit designs and proposal.

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Automobile manufacturers are invited to inquire into the plastic molding facilities offered to them by the Plastic Division of The Standard Products Company. Parts molded from thermo-plastic and thermo-setting plastic materials of all types.

Canadian Controls on Civilian Goods Being Consistently Reduced

Toronto

• • • **Government restrictions** on manufacture of civilian goods in Canada are consistently being reduced, according to reports from Government controlled sources. Earlier reports indicated that all restrictions have been lifted for the production of railroad rolling stock and agricultural machinery, with the result that plants turning out these types of equipment now are operating to the limit of their labor supply.

While both rolling stock and agricultural implements are coming from Canadian plants in a large way for export, a good portion of the output is being provided for domestic use. It has just been announced by F. L. Dickeson, chief inspector for the Manitoba district that an order for $7,000,000 worth of farm machinery has been placed by the Government in preparation for the rehabilitation of returned men who decide to settle on the land under provision of the Veterans' Land Act, 1942.

M. C. Lowe, Administrator of Capital Equipment and Electrical Products, stated that the Wartime Prices and Trade Board has authorized the Canadian manufacture of an additional 10,000 washing machines during the last quarter of this year and this will bring to 33,100 the number authorized since the beginning of 1944.

No vacuum cleaners have been built in Canada in two years. However, because vacuum cleaners are regarded as "almost as essential" as washers, they will be put on a production quota for the first quarter of the new year. Electric stoves now are being built to the extent of 40 per cent of basic period—or as near to that figure as labor and component parts will permit. All restrictions on the manufacture of electric cooking plates, toasters, and irons have been lifted and these will be back on the market within the next four months.

Production will start in January on 10,000 lawnmowers in connection with which restrictions have been lifted as well as on other garden toools. However, labor shortage and difficulty in obtaining components from the United States may affect output.

During the present year, Canadian manufacture of bicycles has been about 60 per cent of the largest production year in the history of the industry and for 1945 it is expected that output will reach 100 per cent of the previous record year. All restrictions have been taken off the manufacture of metal toys and it is stated that some of these will be ready for next Christmas.

While Government authorities have curtailed or abandoned restrictions on the manufacture of a number of lines of civilian goods the future of these producers will depend upon the progress of the war. Should war equipment again come under heavy demand which would tax production capacity of Canadian plants, it would be necessary to return to rigid restrictions on manufacture of civilian goods.

Founder's Meeting Studies Labor And WLB Wage Policies

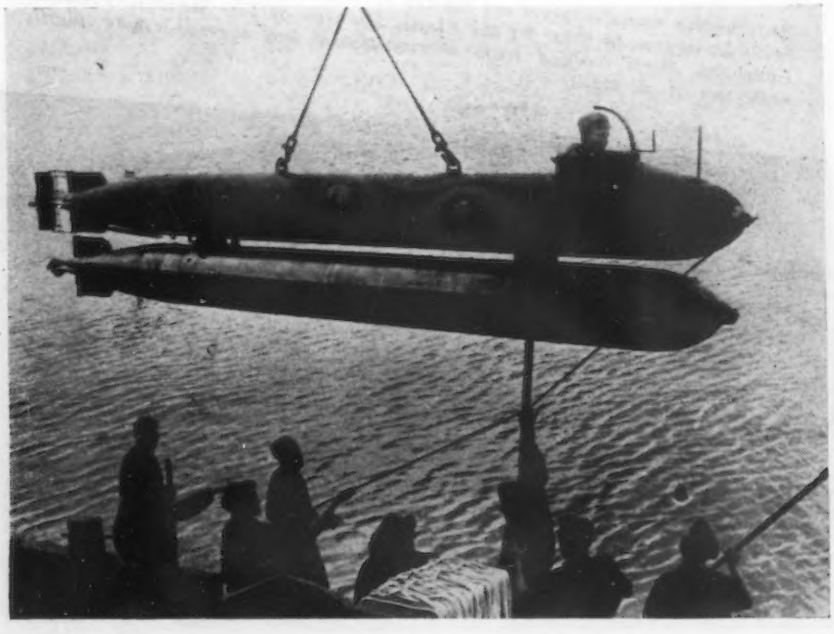
Chicago

• • • **Wage and labor** problems of the foundry industry held the spotlight at the forty-seventh annual meeting of the National Founders Association at the Stevens Hotel, Chicago.

The meeting heard an address by C. Wayland Brooks, U. S. senator from Illinois, on "Strengthening Our American Ideals," and heard a discussion of "A Pattern for Strikes" by Nicholas Kelley, counsel and vice-president, Chrysler Corp., followed by Clark M. Robertson, general counsel, J. I. Case Co., who spoke on "Preparation of War Labor Board Cases." Phil Hanna, business editor, Chicago *Daily News*, spoke on "Where Our Wage Policies Are Leading."

Gilbert H. Montague, New York attorney, addressed the foundrymen with the subject, "A Proper Government Labor Policy." A panel session presented an exchange of views on "The Foundry—Today and Tomorrow."

UNENVIABLE JOB: *A German one-man torpedo being hoisted aboard ship. In maneuvers like these and also when the one-man death dealing machine starts on its way, all that stands between the "one-man" and eternity are precision mechanisms which he hopes will work and which many others hope will jam.*

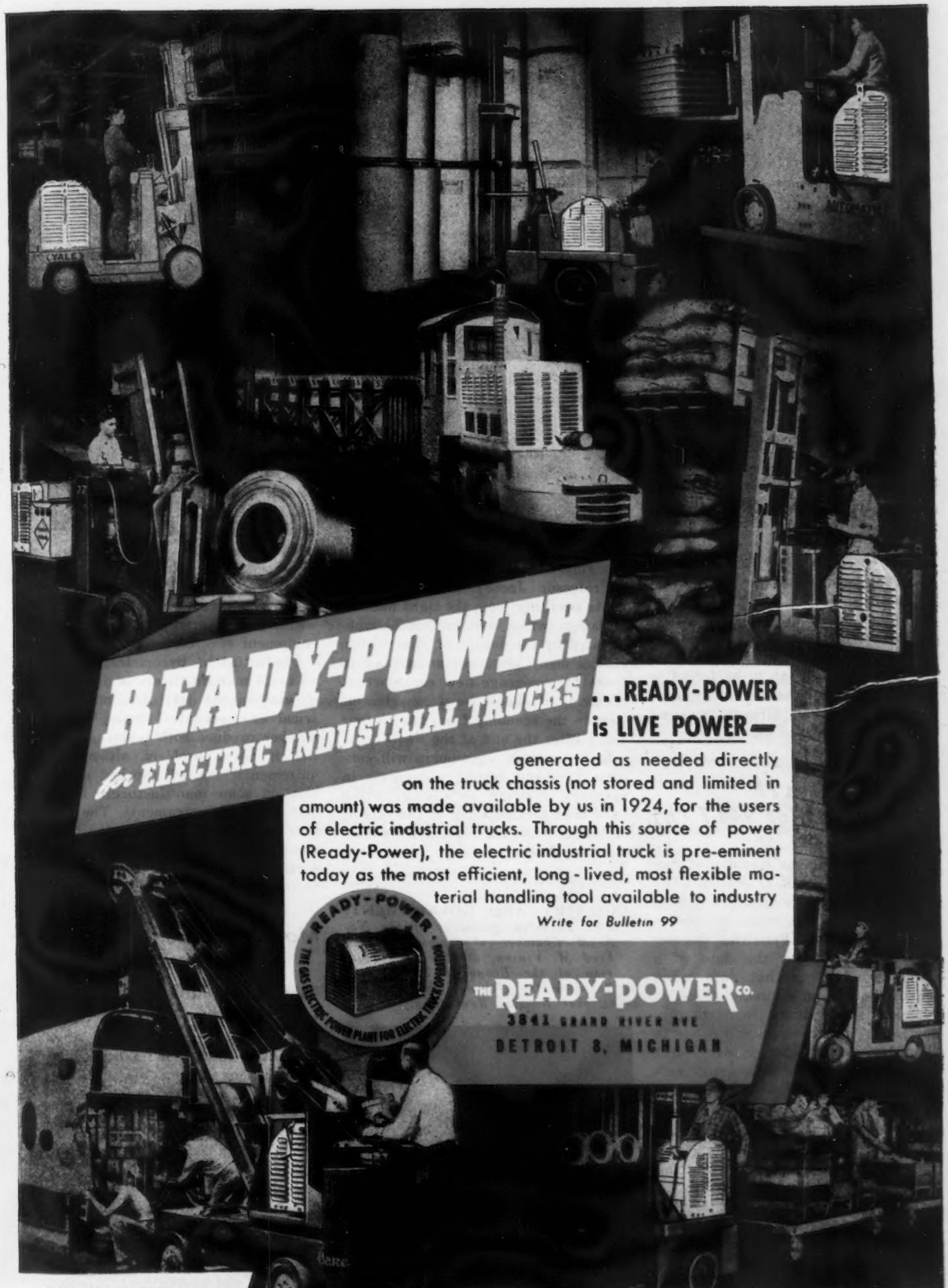


Cutbacks Aid Manpower Situation in Youngstown

Youngstown, Ohio

• • • **At least 2000** to 2500 more workers are urgently needed in the Youngstown labor market to fill war plants' orders for help on high priority war materiel, according to C. E. Davidson, acting manager of the USES.

Layoffs at the MacKenzie Muffler Co., and cutbacks in some steel production here have taken the edge off the acute labor shortage a little, but virtually all industries still need men, Davidson said.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generated as needed directly on the truck chassis (not stored and limited in amount) was made available by us in 1924, for the users of electric industrial trucks. Through this source of power (Ready-Power), the electric industrial truck is pre-eminent today as the most efficient, long-lived, most flexible material handling tool available to industry
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Dr. J. R. Mahoney Declares Geneva Is Suited for Postwar

Salt Lake City, Utah

• • • **The Geneva Steel Co.'s continuous plate mill was built to be easily converted to peacetime production of plate, strip and sheet steel, according to a statement made recently by Dr. J. R. Mahoney, director of economic and business research at the University of Utah before a Salt Lake City men's club.**

Upon completion of needed modifications and additions, the mill would be the only such plant west of the Mississippi River, Dr. Mahoney stated.

See THE IRON AGE, *Sept. 7, page 60.*

According to his statement, other Western steel plants, such as Kaiser's Fontana, California operation would be obsolete in comparison.

He predicted a further discussion of Utah's need for service industries upon this postwar operation at Geneva and urged that the state be prepared to develop in all lines. According to Dr. Mahoney, Utah should anticipate the future industrialization of the state, rather than to be forced to expand water supplies and other functions because of already existing plants after the need has become critical.

WPB Clarifies PR-1 Section 944.7 (b)

Washington

• • • **Clarifying the meaning of "order" as used in PR-1, Section 944.7 (b) so as to provide sequence in production, WPB last week issued Interpretation 12 to Priorities Regulation No. 1 defining the date of a purchase order as that date when manufacturer and customer agree on sufficient specifications to begin production. This definition will apply to all future orders, but is not retroactive, WPB said, and not until sufficient specifications have been furnished is there an official order.**

The affected provision of PR-1 states that, between conflicting orders that bear the same preference rating precedence in scheduling must be given to the order that was received first with the rating. It was pointed out that in many instances specifications are not sent to the manufacturer with the purchase order.

WPB cited an example, where an engine manufacturer receives a rated order on Feb. 1 for 50 engines for July delivery but the customer does not, until March 1, furnish the specifications as to carburetors, pumps, or other equipment necessary before the engines can be put into production, March 1 is to be considered as the date the order was received under the provisions of PR-1.

Argues Cars Should Carry Prewar Price

Chicago

• • • **Postwar automobiles** can be produced at price levels similar to those of 1940 because of technological advances during the war, Professor Neil H. Jacoby, secretary of the University of Chicago, predicted recently.

He declared that the price level could be maintained despite increased wage rates, stating that "the huge volume of production will enable manufacturers to maintain profit margins."

Professor Jacoby foresaw higher rents resulting from the tight housing situation, which will further be complicated by the return of nine million service men. He urged an increase in rents to encourage new construction, declaring it should be a considerable item in the economy from two to four years after the end of the war.

In his opinion, consumers will continue to spend despite a decrease in earnings, drawing on savings which have been accumulating at the rate of 35 billion dollars a year, and increasing their debts.

INDUSTRY AND GOVERNMENT: *Eric Johnston, president of the National Chamber of Commerce, and Fred M. Vinson, director and chairman of the Economic Stabilization Board, at the 27th anniversary of the October Russian Revolution.*

Clarification Of Pyrometer Control Is Issued by WPB

Washington

• • • **WPB has adopted** an amendment to L-265 which exempts from control of the order certain industrial type instruments. These include instruments and their associated circuits used for measuring or controlling temperature, pressure, flow, liquid level, relative humidity, specific gravity, acidity, alkilinity, speed, and power load or frequency of electric power generating stations. Officials of the WPB Radio and Radar Division pointed out that none of these instruments is ordinarily considered to be within the field of radio or electronic equipment.

WPB said that it was never intended that industrial type instruments such as the electronic pyrometer used for measuring high temperatures, should be subject to the limitations of L-265, although they operate electronically through the use of a vacuum tube and technically fell within the original definition of the equipment covered.

Production of pyrometers by some 15 to 20 manufacturers is diversified, it was pointed out; some make electrical or mechanical types, while a number produce both types. Production is not a problem, although requirements of L-265 worked a hardship on some manufacturers making both types of instruments. The situation will be property corrected by the amendment, which affects only a small portion of the process control manufacturing industry, WPB said.

Malleable Foundry Is on Postwar Plan

Ashtabula, Ohio

• • • **Ashtabula's huge**, new malleable foundry, capable of producing 2 per cent of the nation's total tonnage in malleable castings, should be a useful plant after the war, according to J. H. Redhead, president, Lake City Malleable Co., Cleveland, and Lake City Malleable, Inc., the Ashtabula operating company.

"Built under the best ideals in postwar planning, the Ashtabula plant, occupying 55 acres with five under roof, contains the latest in molding and core-making machinery, annealing ovens, and ventilation," Mr. Redhead stated, but he could not predict the disposition that would be made of the plant after the war.

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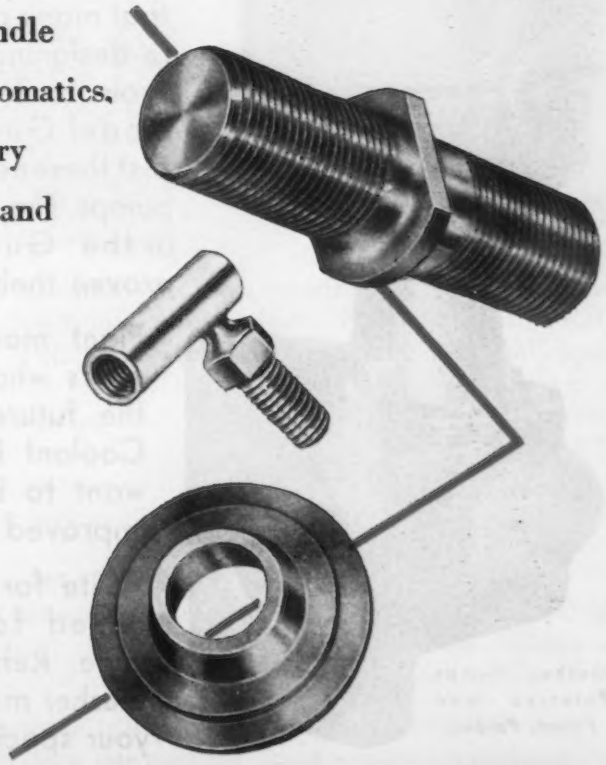
Big Ones

WORK FOR YOU AT TOUREK!

To put production of your screw machine products on a real volume basis, Tourek is fully equipped with the "big ones"—four- and six-spindle automatics of latest design. These and smaller automatics, together with all necessary machines for secondary operations, backed up by outstanding tool room and engineering facilities, enable Tourek to produce your parts in any quantity . . . in any type of metal . . . and in any size up to 2⅝ inches. Put Tourek's engineering ingenuity, top notch equipment, and successful experience of nearly a quarter century to work for you!



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MAKERS OF THE FAMOUS TOUREK BALL JOINTS

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PRECISION SCREW MACHINE PRODUCTS

The Ruthman engineering staff are continually conducting experiments and research toward new developments and improvements in

GUSHER COOLANT PUMPS

Gusher Pumps Patented and Patents Pending

The new Gusher models are so efficiently adapted to the latest type machines and are so advantageous in operation that many plant engineers are re-designing their machine-tools to include these new-model Gushers. By actual test these newer type Ruthman pumps, like their predecessors in the Gusher line, have *proven* their superiority.

Plant managers and engineers who have an eye to the future *specify* Gusher Coolant Pumps when they want to be assured of an improved coolant system.

Write for new catalog, indexed for ready reference. Remember, there is a Gusher model and type for your special needs.

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The "Gusher"—A Modern Pump for Modern Machine Tools

Warehouse Problems Will Be Covered At Pittsburgh Meeting

Cleveland

• • • **The Third Annual War Conference** of the Steel Products Warehouse Association, Inc., will be held in Hotel Wm. Penn, Pittsburgh, Dec. 1, has been announced by W. E. Thoresen, Great Western Steel Co., Chicago, president of the Association, and chairman of its Board of Trustees.

Reflecting the progress of developments on overseas' fighting fronts toward victory and a new era in steel distribution, the program plans bear strongly on the discussion of subjects of special interest and importance to steel distributors and mill sales executives in the reconversion and postwar period, and the selection of Pittsburgh for this year's conference was designed to attract a record attendance of steel executives with a minimum of travel under present conditions.

Following a morning session devoted to Association business, subjects scheduled for afternoon presentation by outstanding authorities from the steel industry and concerned government agencies will cover "Warehouse Operations Under War Controls"; "Price Ceilings"; "Steel Controls in the Re-Conversion Periods"; "War Time Progress in Steel Production"; "Postwar Sales Opportunities for Steel Distributors"; and "Policies and Procedures affecting the disposal of Surplus Steel under the new Surplus War Property Act." Announcement of speakers is being withheld for final confirmation.

Also featured in the conference events are a luncheon address; an official reception for members and guests from the steel industry; and the Association's annual banquet.

Participating in plans for the meeting are members and officials of the several regional groups of the Association located in Chicago, Detroit, Cleveland, the Valley cities, and on the East and West Coasts. To develop the widest possible industry benefit from the Conference program, invitation lists have been extended to include all members of the industry and other steel warehouse associations within travel range of the meeting.

Following recent meetings of the several chapters of the Steel Products Warehouse Association, Clayton Grandy, executive secretary, has announced from the national office here

SHAFER "DE" 22000 BEARINGS

SELF-CONTAINED
SELF-ALIGNING
SELF-CENTERING
under heaviest loads
and adverse
operating conditions

Any experienced engineer recognizes that *most* bearing installations *must* encounter shaft misalignment and deflection . . . end and radial thrust and even heavy shock loads. And more and more engineers are recognizing that only Shafer ConCaVex Bearings have the design and construction that keep them free-rolling, self-aligning and self-centering under *all* such conditions at *all* times. For only Shafer Bearings combine the ball bearing and roller bearing construction . . . only Shafer Bearings combine the low rolling friction of a ball and the high load capacity of a roller. Only Shafer Bearings have such an outstanding record of service on the *tough* installations for the past 25 years. Ask the men who KNOW. SHAFER BEARING CORPORATION, 1422 West Washington Blvd., Chicago 7, Illinois.

The Basic Shafer Idea

Shafer ConCaVex Self-Aligning Bearings combine the advantages of both ball *and* roller bearings. A Shafer Bearing utilizes the effective contact area of a ball many times its size . . . providing automatic end-thrust absorption, superior shock resistance and long life.

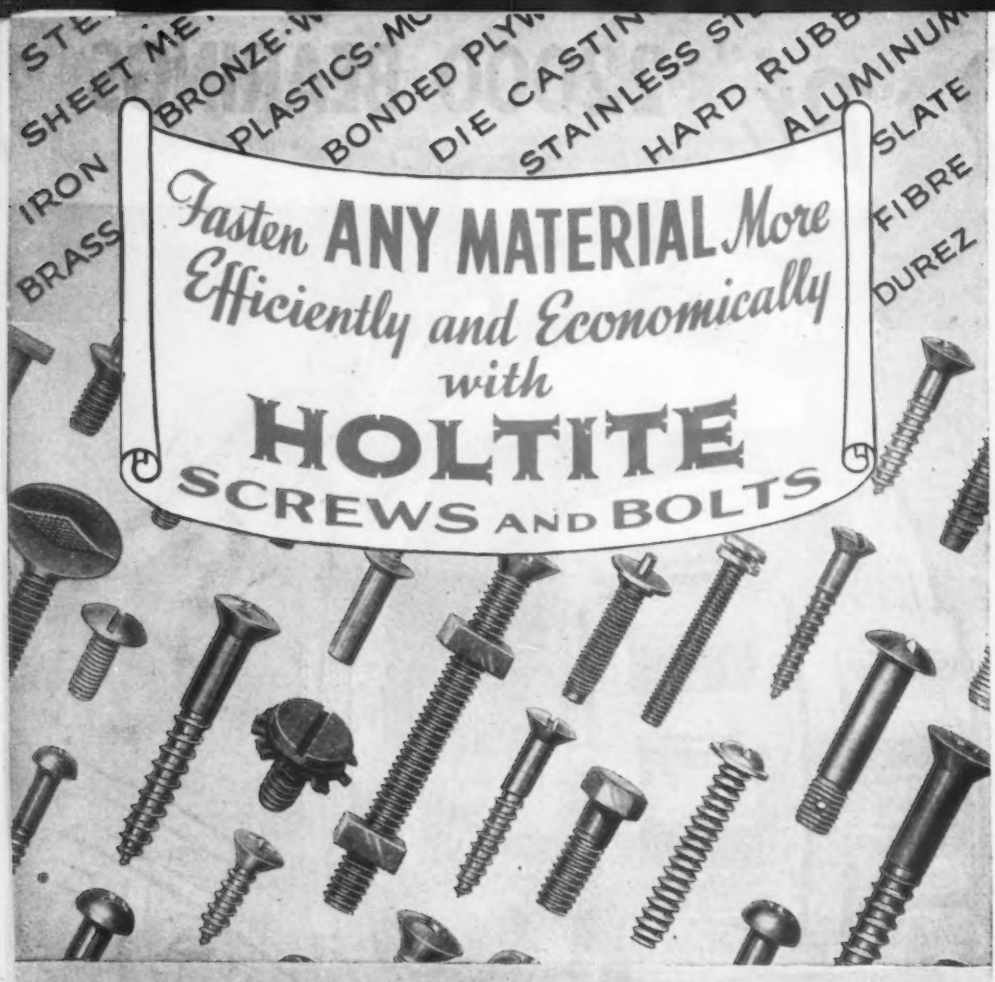
1. SHAFER "DE" 22000 SERIES
The self-contained bearing, preadjusted, ready to install, easy to install. Has one piece outer race, two rows of rollers and single inner race for compactness. Maximum capacity.

2. SHAFER DOUBLE ROW BEARING ASSEMBLY
for building into machines, power transmission equipment, etc. Two outer races, two roller assemblies. A single inner race.

3. SHAFER SINGLE ROW BEARING ASSEMBLIES
One outer race, one row of rollers, one inner race. Self-aligning with radial and thrust load capacity.

SHAFER CONCAVEX
SELF-ALIGNING BEARINGS
Reg. U.S. Pat. Off.

SELF ALIGNING ROLLER BEARINGS



No matter how many problems and worries confront you concerning the kind of material best suited for fabrication in your reconversion to peacetime production—your FASTENING worries have already been eliminated for you!

Whether you use plastics, alloys, wood, steel, brass, bronze, aluminum, castings, hard rubber, or any other material, there is a HOLTITE product designed especially to fasten it efficiently and economically . . . finished to match any material.

When special fasteners will effect greater economies or improve assembling, we are completely equipped to produce Special Parts and Fastenings exact to specifications, blueprints or samples.

Wartime conservation makes it impossible to send catalogs unless requested on your company letterhead

HOLTITE-Phillips Recessed Head SCREWS & BOLTS

Recessed Head permits safe power driving to cut fastening time and costs in half. Stronger, neater job results—no spoilage, injuries, burred or broken heads.

Thread-Forming Sheet Metal Screws

Eliminate tapping operations — these hardened screws cut perfect mating threads as they are driven in sheet metal, plastics, castings. Tighter fit to defy vibration.

"Lock-Tite" Assembly Screws

The lock washer is an integral part of the screw — a HOLTITE fastening innovation that embodies in ONE UNIT more advantages than separate lock washer and screw assemblies.

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BUY MORE BONDS

the election of regional officers and trustees for certification to the Third Annual Meeting of the Association which convenes in Hotel Wm. Penn, Pittsburgh, Dec. 1. Elected for regional offices were:

Chicago Region: H. W. Angsten, Corey Steel Co., Chairman and trustee; Sol Fox, National Sheet Steel Co., vice-chairman; Bernhard Gordon, Caine Steel Co., treasurer; Thomas J. Reid, Century Steel Co., secretary; and Harry Alpirn, Briggs & Turivas, trustee.

Detroit Region: Maxwell Jospey, Production Steel Co., chairman and trustee; Al Rist, Lion Steel Co., vice-chairman; E. C. Shumer, Reliance Steel Division—Detroit Steel Corp., secretary-treasurer; and Joseph Gendelman, National Sheet Steel Co., trustee.

Cleveland Region: Harry Resnick, Universal Steel Co., chairman and trustee; M. S. Phillips, Lake Erie Steel & Blanking Co., vice-chairman; H. J. Mervis, Singer Steel Co., treasurer; David Moritz, Regent Steel Co., secretary; and J. B. Ribakoff, Reliance Steel Division, trustee.

Valley Region: J. E. Lavine, Union Steel Co., Warren, chairman and trustee; Harry Hoffman, The Wilkoff Co., Youngstown, vice-chairman; Raleigh Levy, Allied Metals, Inc., Niles, secretary-treasurer; and Donald C. Lott, Tin Mill Products Corp., Pittsburgh, trustee.

These officials, together with national officers and four trustees-at-large to be elected at the Pittsburgh meeting will direct the Association's activities during 1944-45.

Lake Ore Shipments Down

Cleveland

• • • Shipments of Lake Superior iron ore from upper lake ports during October amounted to 10,531,212 gross tons from U. S. ports and 63,776 tons from Canadian port, totaling 10,594,988 gross tons, according to report of the Lake Superior Iron Ore Association. This was a decrease of 1,017,554 tons from a year ago when U. S. ports shipped 11,545,506 tons and Canadian ports shipped 67,036.

Cumulative totals for the season to Nov. 1 were 76,081,699 tons from U. S. ports and 416,473 tons from Michipicoten, or a total of 76,498,172 tons, a decrease of 216,665 tons from the same period a year ago when U. S. shipments had been 76,333,448 and Canadian had been 381,389 tons making a total of 76,714,837 gross tons to Nov. 1, 1943.

Follansbee's approach to the new and difficult steel-making jobs is exemplified by its development of Seamless Terne Roll Roofing. This achievement is an important reason why you can entrust your requirements for alloy and other special steels—as well as Terne roofing—to this compact, highly skilled organization.

For more than a century, Terne plate had been manufactured in small sheets which the roofer seamed together. Terne roofs dating from Colonial days are still in good condition and through the years they have required little maintenance. There would seem to be slight opportunity for improving so satisfactory a product.

But Follansbee *found that opportunity* with its process of Terne-plating lengths of steel up to 100 feet. By eliminating cross-seaming, the application of a Follansbee Terne roof is easier and faster . . . labor costs are less . . . and maintenance is reduced. In the few years since its introduction, hundreds of thousands of rolls have been installed throughout the country, to the great advantage of all concerned.

You will find advantages all along the line in dealing with Follansbee and using Follansbee products.

FOLLANSBEE STEEL CORPORATION

GENERAL OFFICES • PITTSBURGH 30, PA.

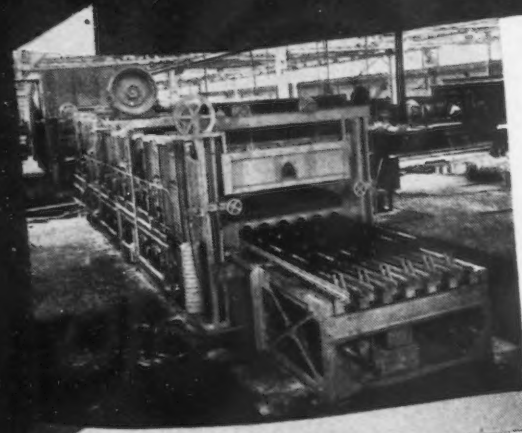
Sales Offices—New York, Philadelphia, Rochester, Cleveland, Detroit, Milwaukee. *Sales Agents*—Chicago, Indianapolis, St. Louis, Nashville, Los Angeles, San Francisco, Seattle; Toronto and Montreal, Canada. *Plants*—Follansbee, W. Va. and Toronto, O.

ALLOY BLOOMS & BILLETS, SHEETS & STRIP • • • COLD ROLLED CARBON SHEETS & STRIP
POLISHED BLUE SHEETS • ELECTRICAL SHEETS & STRIP • SEAMLESS TERNE ROLL ROOFING

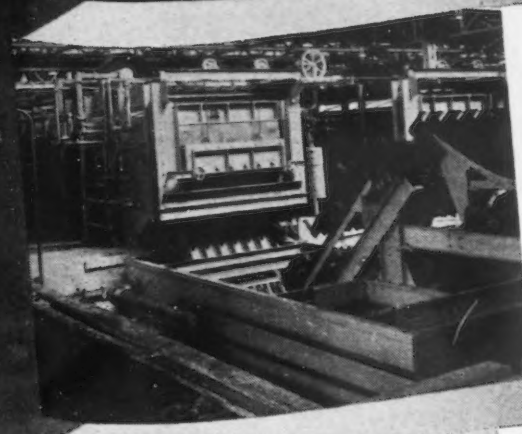
It Takes the Best to Make the Best

Prepare

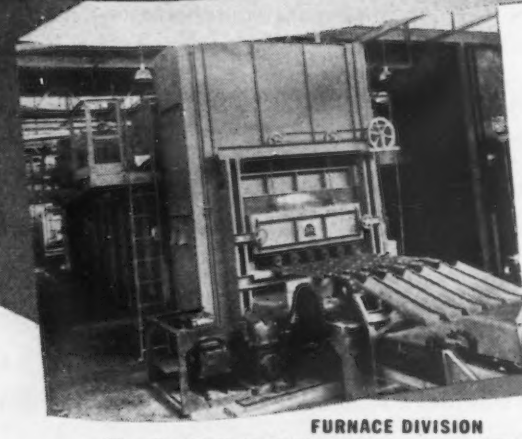
for Post-War Production with R-S Continuous Furnaces



Unexcelled engineering ability in the production of heat-treated heavy artillery shells is exemplified by this automatic, gas-fired R-S installation. The shells are pushed through the hardening furnaces in six parallel conveying tubes.



Shells are quenched internally and externally, then leave the quench tanks on continuous conveyors.



The draw furnaces, through which the shells move on alloy chains. The result is uniform heat-treatment and low cost production.

FURNACE DIVISION

R-S PRODUCTS CORPORATION

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R-S Furnaces of Distinction

PLATE AND ANGLE HEATING

ANNEALING CONVECTION CAR HEARTH ROTARY HEARTH

CONTINUOUS CONVEYOR SALT BATH FORGING METAL MELTING

Buy War Bonds

Rural Electrification Big Postwar Market Says NEMA President

Pittsburgh

• • • **A. C. Streamer, vice-president** of Westinghouse Electric & Mfg. Co., and newly elected president of the National Electric Manufacturers Association, this week in Pittsburgh outlined some of the postwar aims of this 444 producer member association. While the demands of the Army, Navy and the war will demand practically the full resources of the industry, the association is laying out plans and examining markets of the postwar period, Mr. Streamer said in his outline.

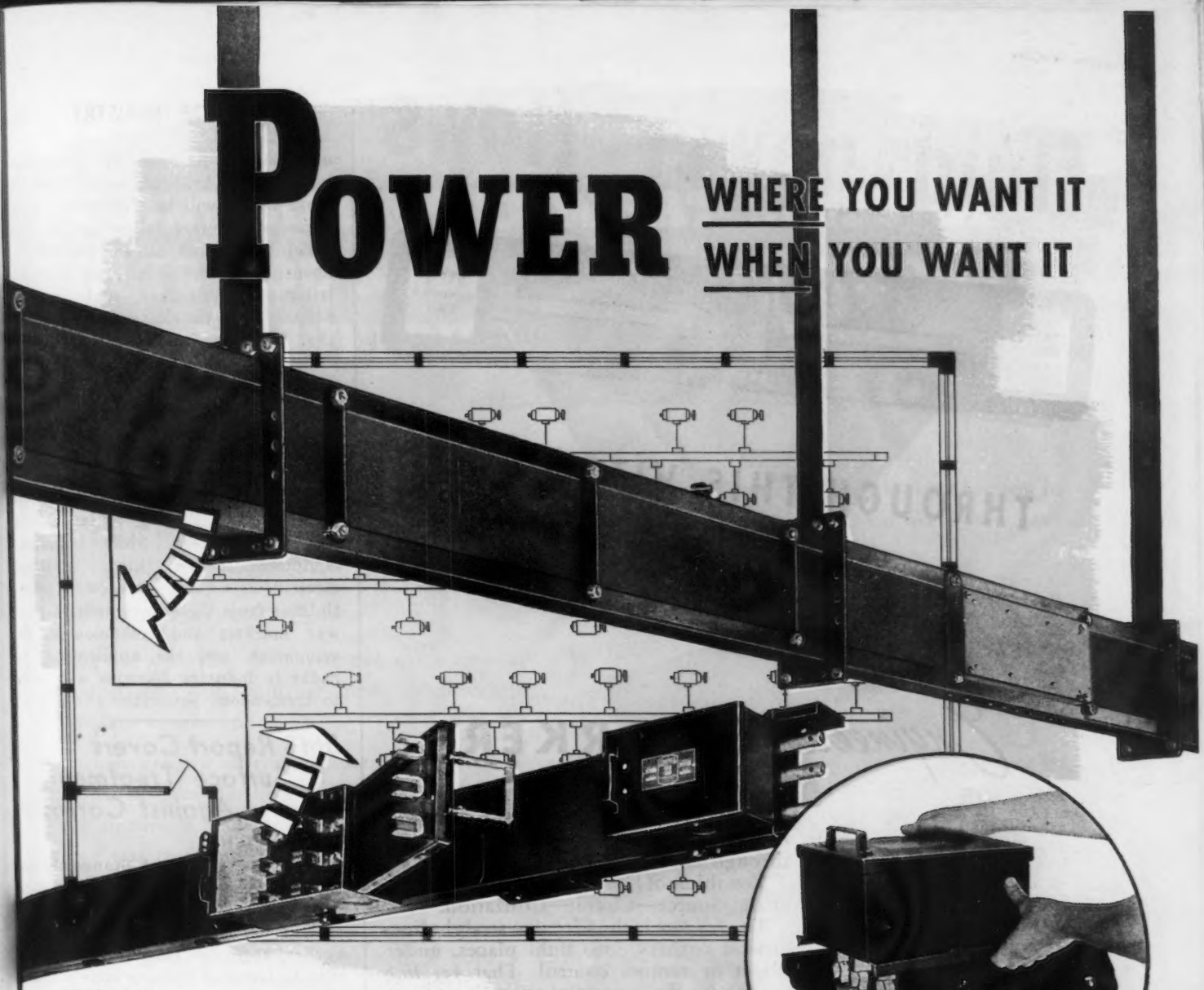
A. C. Streamer

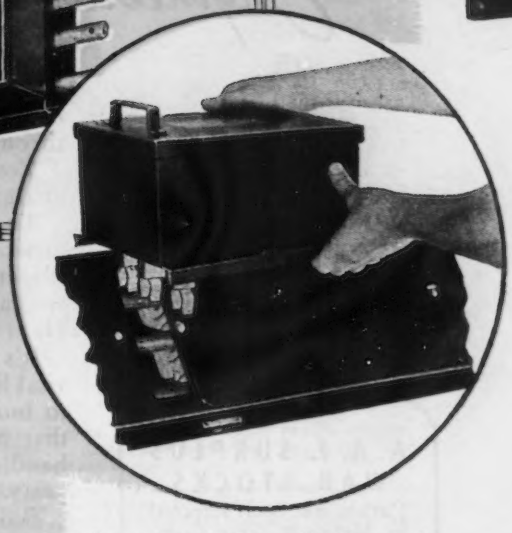
Home and rural electrification are the prime items on the list of prospective huge markets in the electrical manufacturers field. The electrification of farms, increasing from 800,000 in 1933 to 2,600,000 in 1944 is expected to rise to 3,120,000 by 1947. In the housing field, the expected 1,000,000 homes a year building program for the eight years following the war, plus the re-electrification of many homes already built will likewise offer large markets. Of the 32,000,000 homes now in existence, Mr, Streamer stated that at least 95 per cent or 30,000,000 are inadequately wired.

The growth of the packaged unit for domestic electrification, as well as for industrial electrification and power generating, will be one of the major accomplishments of the electrical industry. This program is being backed by, in addition to the NEMA, the National Electrical Contractors Association, the National Electric Wholesalers Association, and the Edison Electric Institute. Such a program, it is said, will be such that it is included in the completed structure and as much an integral part as the foundation. It will include, of course, all electrical equipment that is necessary for comfortable living, such as refrigeration, cooking, possibly water heating, garbage disposal, and other such phases.

As an indication of the prospects

POWER WHERE YOU WANT IT WHEN YOU WANT IT





HERE is a modern power distribution system with a degree of flexibility unobtainable with ordinary fixed outlets, conduits and wires. It provides a plant-wide distribution of electric energy with important, time-saving accessibility.

SAFLEX PLUG-IN DUCT permits plugging-in for power service anywhere in the plant. It enables you to add new machines, or rearrange present equipment without the usual major operation on the wiring system. Put a machine where you want it. Your power is available on a moment's notice.

SAFLEX FEEDER DUCT serves as a feeder bus for the branch circuits of Saflex Plug-in Duct, or any other service where a heavy current feeder is needed. Because it has convenient tap connections at frequent intervals throughout its length, it serves as a perfect backbone from which to build complete distribution systems for resistance welder installations.

Call in a Square D Field Engineer

Now is the time to bring your wiring system up to date for the highly competitive future. Address Square D Company, 6060 Rivard Street, Detroit 11, Michigan, for Bulletin 6000. Or let a Square D field engineer help you plan for greater efficiency in electrical power distribution.

SQUARE D COMPANY

DETROIT • MILWAUKEE • LOS ANGELES

fluid power flows

THROUGH THIS VITAL LINK

Engineered by **PARKER**

THE PARKER COUPLING

is the key to the vital link, engineered and designed by Parker—protected against leakage and vibration, precision-made, quick to install, quick to service.

A. A. F. SURPLUS WAR STOCKS

Parker has been selected by Metals Reserve Company to market surplus A. A. F. war stocks of valves and fittings. Immediate delivery assured. For specifications and installation recommendations, write, wire or phone.

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Agent for
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Fluid Power, the modern way to get things done, is carried wherever you want it to go through tubes, and controlled by valves.

You think of Fluid Power as a three-link chain; Source—Circuit—Utilization.

The *key link* is the Circuit—straight line, around corners, into tight places, under direct or remote control. That *key link* is vital, for the successful operation of any Fluid Power application depends on it!

It's Parker's business to engineer this vital link—to design it, build it, install it—to build the precision valves and fittings that make it function, and the tools to handle them. We've been at it for twenty years.

Fluid Power Engineering is a young science, based on the old familiar principles of hydraulics. War has intensified its uses—multiplied the number of jobs it can do.

Whatever kind of equipment you operate or build, or plan to build, chances are Fluid Power will make it work better, or cut its cost, or increase its usefulness.

A Parker Fluid Power engineer will gladly discuss these interesting ideas with you. Write to The Parker Appliance Company, 17325 Euclid Avenue, Cleveland 12, Ohio.

THE
PARKER
APPLIANCE COMPANY
CLEVELAND • LOS ANGELES
FLUID POWER ENGINEERING

of postwar markets, Mr. Streame pointed out that at least 1,000,0 more farms will be electrified in t three year period following the wa which will mean an expenditure about $250,000,000 in lines and di tributing equipment and anothe $450,000,000 in electrical equipme that is used on these farms.

In analyzing the postwar marke for electrification and electric equipment, Mr. Streamer mention as the first item consumer good which will be in production in six t eight months after the end of th war and which forms a tremendou market. Distributing apparatus i also a big item, while industria equipment comes third. Railroa electrification has unknown pote tialities from the standpoints of pos war markets and technological de velopment, and the applications o radar in industry likewise will gro to tremendous proportions.

BMS Report Covers Surface Treatment Against Corrosion

Washington

• • • **The Bureau of Standards** ha issued its third and final report cover ing the investigation of surface treatments for protecting steel against corrosion, with special refer ence to low-cost housing construction. Known as Building Materials and Structures Report BMS 102, the re port gives results of a large number of tests on priming and finish coat paints. Both outdoor exposure and accelerated laboratory tests were used, and the primings were applied to treated and untreated steel and to galvanized iron panels. The effect produced by improving the protective value of primings by pretreatment processes was given special consider ation.

The composition of the paints and the relative ratings, based on their performance in these bureau tests, are discussed in detail. For instance, zinc chromate and iron oxide-zinc chromate primings, when properly formulated with a synthetic resin vehicle, make very good rust-inhibitive coatings. The zinc dust paints, particularly the alkyd type, have a good adhesion on galvanized iron. Among the top-coat finishes tested, aluminum, black and dark-colored paints were the most durable. Copies of this report are obtainable at 10c. each from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

IN DETERMINING WHAT SIZES OF BOLTS YOU NEED IN APPLICATIONS WHERE WEIGHT IS IMPORTANT!

Quite obviously, if you can use a smaller bolt than you had planned for, you can save some critical steel and you can drill smaller holes.

If you use a smaller bolt, you can use a smaller nut, and thus you subtract more dead-weight from your assembly.

But those are not all the advantages achieved by your use of a smaller bolt, for just by using it you set in motion a train of circumstances favorable to our war production effort.

For instance, we are required to buy, stock and consume *less than half as much raw material* to make the ½-inch bolt as for the ¾-inch bolt.

By requiring *less material,* we free material *we did not use* to other manufacturers. And by the same token, we need less railroad freight car capacity to get the smaller quantity of material, and less space in which to store it in our warehouse prior to manufacture.

Add up all these conditions and intelligent engineering makes another direct contribution to winning this war in addition to all the others already made in so many directions. Intelligent engineering avoids allowance for the "ignorance factor"—which in our product is the specification of a bolt much larger than is actually necessary to do the job.

Lamson bolt engineers will gladly help you avoid making any allowance for an "ignorance factor" —will help you select the right bolt you need for any given job—and then make it right for you in every detail in any quantity you need—*now, and after the war is ended.*

THE LAMSON & SESSIONS COMPANY, General Offices, Cleveland, O.

"BOLTS, NUTS & SCREWS"—1944 REVISION, Cloth bound, Limited edition, 180 pages of technical, practical information. Sent prepaid for *$1.00—cash or check must accompany your order.*

"BOLTS ARE IMPORTANT!"—24-page booklet of currently useful information for buyers of headed and threaded products, and describing Lamson & Sessions' specialty fastenings which have wide industrial applications *—now, and in the post-war period. Sent gratis.*

"THE LAMSON BLUE BOOK"—is our standard Catalog of standard products excepting our Aircraft products. *Sent gratis.*

"SIMPLIFIED STOCK LIST"—Of bolts, nuts and screws, conforming to latest revisions of the Office of Price Administration, and of great value in showing you in what ratio quantities of various standard products are kept in stock for deliveries, by your jobbers and in our own (and other bolt manufacturers') warehouse stocks. *Sent gratis.*

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Please send us ☐ Lamson Blue Book ☐ Bolts, Nuts & Screws ($1.00)
☐ Bolts are Important! ☐ Simplified Stock Sizes

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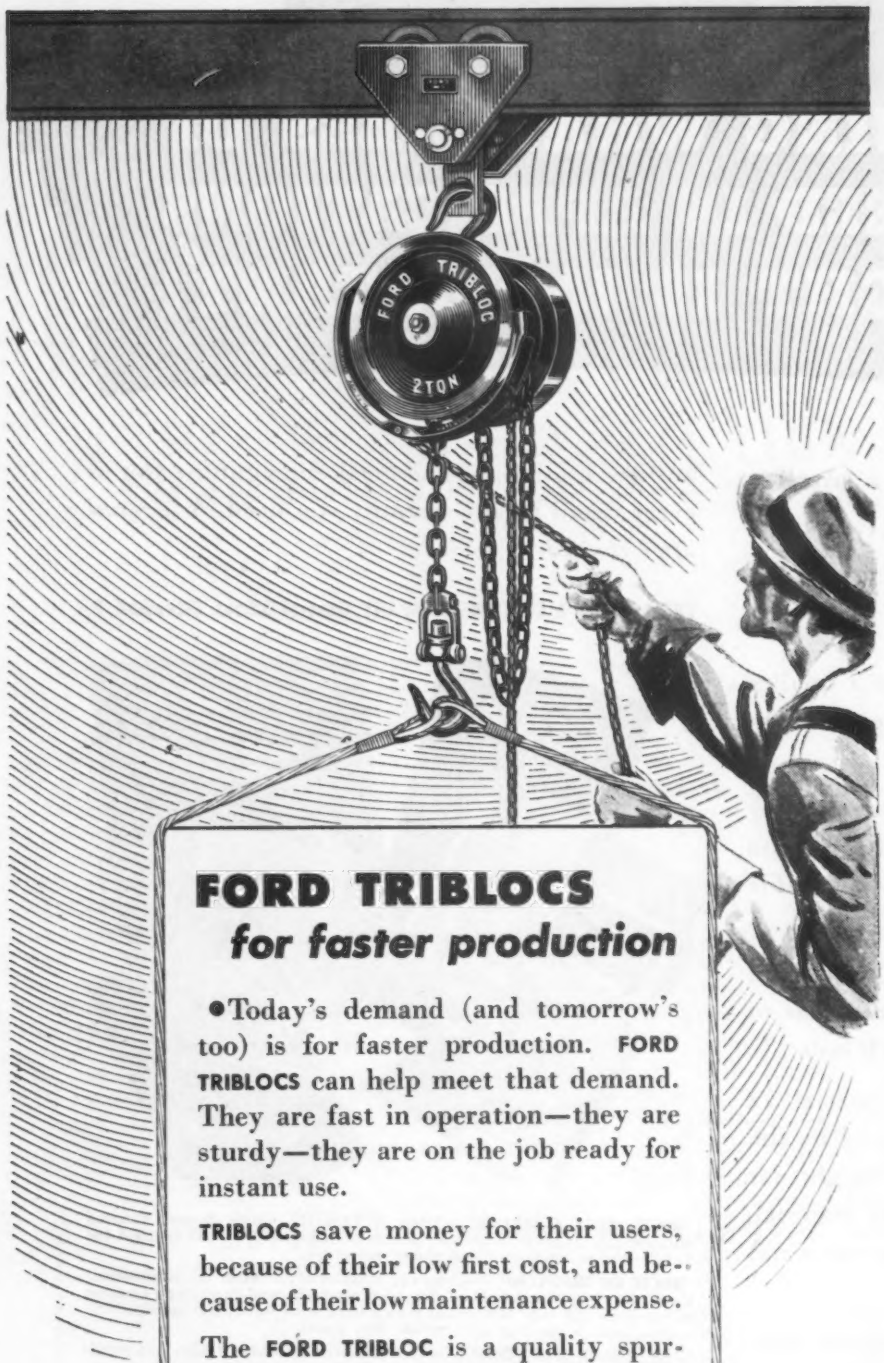
BOLTS · · NUTS · · COTTERS · · CAP SCREWS · · SPECIALS

Your Jobber Stocks the Lamson Line



FORD TRIBLOCS
for faster production

•Today's demand (and tomorrow's too) is for faster production. **FORD TRIBLOCS** can help meet that demand. They are fast in operation—they are sturdy—they are on the job ready for instant use.

TRIBLOCS save money for their users, because of their low first cost, and because of their low maintenance expense.

The **FORD TRIBLOC** is a quality spur-gear hoist. It is made throughout of high-grade drop forgings and malleable castings of certified grade. Its ACCO high carbon heat-treated chain has great strength and wearing qualities. Write for information on **TRIBLOCS** in ¼-ton to 40-ton capacities.

Order from your Distributor

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Philadelphia, Chicago, San Francisco, Denver
Los Angeles, Portland

AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT • CONNECTICUT

FEATURE CONTINUATION

Building Up Worn Parts

[CONCLUDED FROM PAGE 51]

tion is usually 0.001 to 0.002 in.[5] per hr., and of chromium 0.0004 to 0.0008 in. per hr. Effective rates may be down to one-third of these values according to the shape and accessibility of the surface to the depositing current.

[5] American practice is to use higher plating bath temperatures and higher current densities which permit faster rates of deposition.

Thin deposits not more than 0.005 in. in thickness can be built up on simple shapes, such as a cylindrical shaft, within a tolerance of ±0.001 in. This method of plating within tolerance dimensions is used by skilled platers for surface hardening with thin chromium coatings of the order of 0.001 in. or less. Where much heavier coatings of chromium are demanded, and with any thickness of nickel, it is usually preferable to apply a thicker deposit than is needed and to grind or machine to size. It will be immediately apparent to engineers that in order to take advantage of the high hardness of electrodeposited chromium the metal must be applied in sufficient thickness to withstand indenting forces or the base metal must be chosen with hardness sufficient to permit an economically thin coating.

Facility in electrodeposition is determined by the accessibility of the surface to the electroplating current and the weight and ease of manipulation of the article.

External sufaces, especially flat or cylindrical areas, are readily built up. Areas containing sharp edges or angles are less easily built up with uniformity. Narrow ledges and patches are also likely to be irregular in thickness. Excess metal has to be deposited to insure sufficiency in the corners. Areas in recesses, slots and holes are less easily treated, especially when sharp re-entrant angles are included. Slots and pockets in which the depth is less than the width present no serious difficulty.

Holes in which the length is greater than the diameter call for special care. Long bores, deep slots and recesses should not be attempted by platers without special experience. The relative ease of applying deposit to differently shaped or contoured articles will be more readily understood by reference to Figs. 6 to 9.

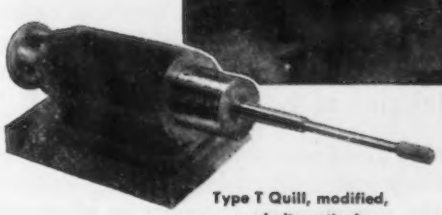
"BUSINESS" MACHINE!

USE IT TO CUT YOUR GRINDING COSTS!

You can hold it in one hand, yet it embodies in a single compact unit all the essentials required to convert a basic machine tool such as a lathe or a miller into a production capacity precision grinder. Its accuracy is making a significant reduction in spoilage waste and its dependable stamina is a positive protection to the production schedule of countless metal working plants.

Often the Dumore Quill is used as in the accompanying illustration, mounted alone on a basic machine tool and driven by a power source already available in the basic tool or the plant drive system. More often, of course, the quill is seen and used as the integral "heart" of the familiar Dumore "Tool-Post" Grinder—with the motor and belt drive mounted to the quill-holding frame for flexible adaptability in one self-contained tool. Features of the Dumore Grinder—setup convenience and operating facility, vibrationless precision of ±.0001" accuracy at speeds up to 42,500 r.p.m., moderate cost, extensive and varied specialized applications—have obvious parallels in management and production interests: job simplification and reduced job training requirements, maintenance of quality standards *and reduction of rejection losses,* moderate investment requiring modest depreciation provision and allowing reasonable production cost of unit grinding operations.

Dumore X18 Quill in use on large standard grinder



Type T Quill, modified, used alternatively

Your nearby industrial distributor will be glad to tell you how Dumore can save costs and maintain quality in *your* production.

Call him—or write today to The Dumore Company, Tool Division, Dept. TL24, Racine, Wisconsin.

DUMORE

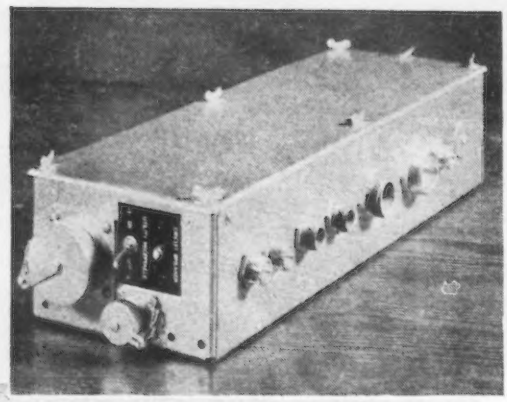
PRECISION AND OFF-HAND GRINDERS

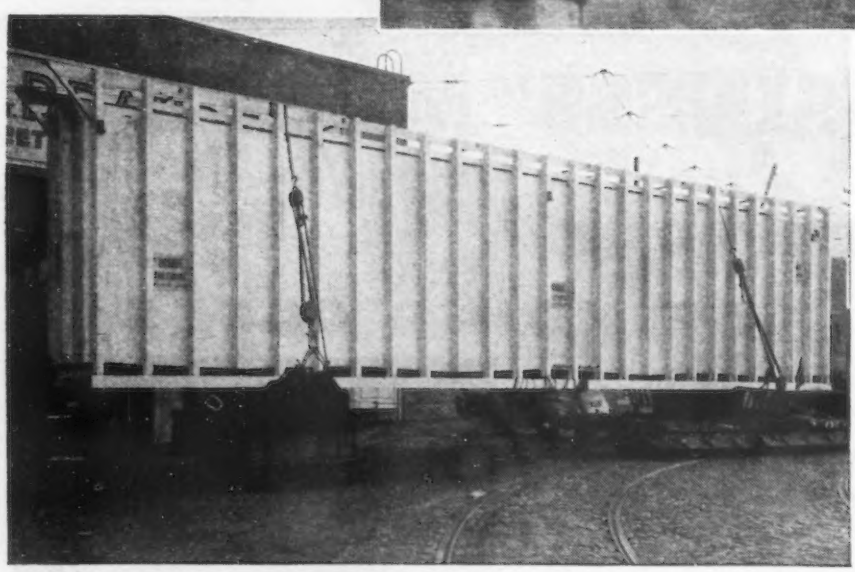
SOLD BY AUTHORIZED INDUSTRIAL DISTRIBUTORS IN ALL PRINCIPAL CITIES

Electrical Junction Box (*right*) for use on Martin PBM airplanes. Produced of aluminum, by stamping, welding and punching processes. Built by Brandt of Baltimore.

• • •

30-Ton Plating Tank (*below*) for use with Continuous Electrolytic Tinning Lines. Plating Tank and Tinning Lines engineered, fabricated and installed by Brandt of Baltimore.





For Precision in Heavy Plate and Sheet Steel Work

Call BRANDT of Baltimore

If your plans for postwar production call for work done by an experienced metal fabrication plant, call on Brandt of Baltimore.

The Brandt 8½-acre plant has complete, modern equipment for shearing, rolling, forming, welding. Machine capacities range from the lightest gauge sheet up to and including 1¼ mild steel or ¾" armor plate. All metals, ferrous, non-ferrous, and alloy, can be completely fabricated to your specifications.

At the present time our production ranges from small, formed units to huge fabricated assemblies. Our designers and engineers will welcome the opportunity to assist in planning the details and specifications of your postwar production. Naturally, all plans will be held in strict confidence. So if there is a fabrication or design problem in your postwar plans, we invite you to discuss it with Charles T. Brandt, Incorporated, 1700 Ridgely St., Baltimore 30, Md.

BRANDT of Baltimore • Craftsmen in Metal Since 1890

September Munitions Output Falls Behind Yearly Average by 2%

Washington

• • • **September munitions output** amounting to $5,300,000,000 was two per cent below the monthly average for the year, according to the WPB. It missed the first-of-the-month goal by four per cent.

Ammunition and "other equipment and suplies" were the only categories to show an increase over August. No major category made schedule except "other equipment and supplies." A detailed brief of WPB's report follows:

Aircraft—Despite the decline in aircraft production, September output on a dollar-value basis was greater than the average monthly rate needed to meet schedules for the remainder of the year under the new W-12 program. Required monthly production for the last quarter averages less than $1,500,000,000 per month.

For the first time, both plants turning out engines for super-bombers ran ahead of schedule, but production of all engines in September missed schedule by six per cent and fell 12 per cent away from the all-time peak reached in August.

Aircraft as a whole, including airframes, propellers, spare parts, etc., also fell short of forecast and the preceding month. Total output of $1,539,000,000 was five per cent below schedule and August.

Ordnance—Revised figures show that, over all, the heavy field artillery program met or exceeded first-of-the-month goals. Heavy artillery ammunition output, including naval, was up 16 per cent, but missed schedule by two per cent. The 155 mm. howitzer HE shell, though it increased sharply over August, failed to meet the rapidly rising schedule. Fragmentation bombs fell two per cent short of the first-of-the-month schedule, and acceptances of the 500-lb. general purpose bomb missed by a wide margin. Aerial bombs as a whole were up four per cent, but two per cent short of the goal.

Vehicles — Deliveries of heavy trucks increased nearly 400 to 4850, but failed by 560 to meet the first-of-the-month goal. Light-heavy trucks also fell far short of their mark, since 17,700 were delivered as against 20,520 in August and a goal of 21,600. Of the medium tanks, only the M4

BRING ON YOUR VIBRATION!

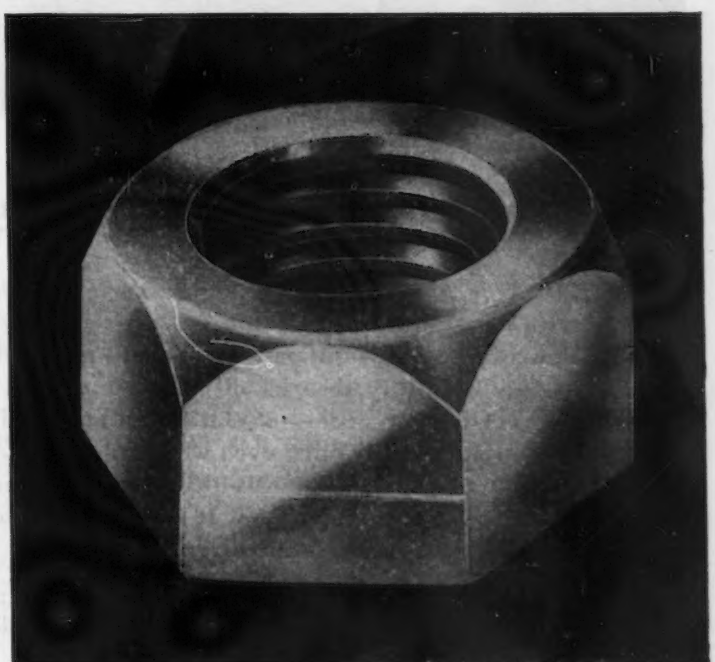
THE STOVER SELF-LOCKING NUT can "take it"!

When you have tested this *new-principle* self-locking nut, you will understand the true meaning of vibration resistance. You will see a precision-made nut which has been transformed into a powerful, metal spring. You will see the natural elasticity of metal employed to provide a mighty *grip* that defies vibration.

And yet the STOVER Self-locking Nut is a simple thing. It is in one piece with no complicated assembly. It does the whole job by itself. It locks at any point desired on the bolt and does no harm to the bolt threads. It can be used over and over without substantial loss of efficiency. It is made in standard sizes and threads from ¼ inch to 1½ inches. Finally, it costs no more than older-type less efficient lock nuts.

Send for descriptive literature and samples.

STOVER
"IT WON'T SHAKE LOOSE"



PATS. PEND.

MEETS ARMY AND NAVY SPECIFICATIONS

The STOVER Self-locking Nut is eliminating the loosening effect of vibration on many machines of war. Study it in relation to your postwar planning.

STOVER LOCK NUT
AND MACHINERY CORPORATION
Easton, Penna., Bushkill Drive • New York 17, N. Y., 101 Park Ave.
REPRESENTATIVES IN PRINCIPAL CITIES

SHE CAN EAT OFF THE FLOOR

AFTER *SPEEDI-DRI* HAS DONE ITS WORK!

SO EFFICIENT is SPEEDI-DRI, oil and grease absorbent, that it's literally true to say that your employees can eat off a Speedi-Dried floor. Think what SPEEDI-DRI can do in your plant: Increase plant cleanliness—SPEEDI-DRI absorbs all oil and grease, even old deposits. Lower accident records—SPEEDI-DRI is anti-skid. Check fire—SPEEDI-DRI will not readily burn even when oil-soaked. Save cleaning costs and production time—SPEEDI-DRI is spread by hand and swept up with a brush while work goes on. It does away with all expensive cleaning machinery, caustics and solvents.

SPEEDI-DRI is more effective and less expensive than any of the old methods of removing oil and grease. Get the facts—write for literature and a FREE SAMPLE.

SUPPLIERS: East—Refiners Lubricating Co., New York 1, New York.
Midwest & South—Waverly Petroleum Products Co., Philadelphia 6, Pa.
West Coast—Waverly Petroleum Products Co., Russ Bldg., San Francisco 4, Calif.

SPEEDI-DRI
OIL AND GREASE ABSORBENT

carrying the 75 mm. gun ran ahead of schedule.

Communication and Electronic Equipment—Output of airborne radio for the Navy fell short of the mark by 16 per cent, and for the Army by four per cent. Communication and electronic equipment production as a whole, at $343,000,000, was slightly below August and five per cent behind schedule.

Navy Vessels—Completion of 24 major vessels helped to swell the September tonnage of Navy-built ships, with deliveries on a tonnage basis rising 29 per cent over August, but falling 12 per cent short of the September schedule forecast. Combatants showed an increase of 233 per cent from August deliveries, but still were 14 per cent below the schedule. Other crafts including patrol and mine, auxiliaries and district dropped in deliveries and in per cent of deviation. Navy conversions of combat-loaders, which were given special priority, missed their reduced September schedules.

Maritime Commission Ships—Maritime Commission ship construction ran two per cent ahead of August, and completions of 127 vessels virtually net the first-of-the-month schedule. The all important combat-loader program showed improvement, but still remained critical.

Merchant-ship construction declined four per cent from August, but still was three per cent ahead of schedule.

Briggs Mfg. Purchases Plumbing Ware Company

Detroit

• • • **Briggs Mfg. Co. has purchased** the John Douglas Co. of Cincinnati, Ohio, independent manufacturer of plumbing ware and plumbing fixtures.

The purchase will give 'Briggs enough facilities so that it will be able to offer complete lines of plumbing fixtures for residential installations and institutional projects like hotels and hospitals. The prewar Briggs facilities for enameled iron bathtubs, lavatories and sinks did not provide for manufacture of china plumbing ware or plumbing fixtures.

Briggs entered the plumbing ware field in 1932. The John Douglas Co., incorporated in 1890, will function as a Briggs subsidiary, its operating manager being the grandson of the founder, John Douglas III. Its facilities include a brass foundry, a 300 ft. continuous furnace tunnel kiln, engineering department, machine shop, casting shops and polishing, plating, assembly, and clay-handling.

. . . help sustain high production, and precision

Kennametal centers outlast high speed steel centers 50 to 100 times, because the nib is made of special, very hard, non-galling grade of carbide. Increased production rates can thus be sustained—jobs keep turning on Kennametal centers, while steel centers are being removed for grinding many times—40, 50, or even 100.

Chatter due to center wear is eliminated and accurate machining thereby maintained. Costs are reduced—fewer centers need to be reground—less idle time of machine and operator for replacements.

The unique ability of Kennametal centers to keep work running true makes them well suited for precision jobs on grinders, and, when teamed with Kennametal lathe tools, they help to assure such accurate turning that grinding operations can often be eliminated.

Kennametal centers are stocked in standard sizes—Morse, Brown & Sharpe, and Jarno tapers. Separate, accurately molded nibs are available for those who wish to make their own centers. Catalog 44 describes them. A copy is yours for the asking.

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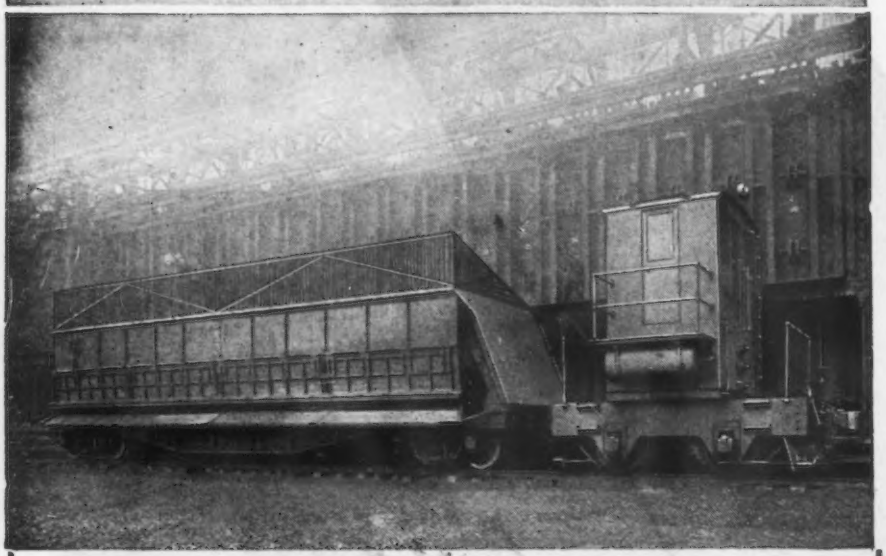

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Accidental Losses Of Manpower Draw Official Attention

Washington

• • • **Manpower losses** due to industrial accidents are attracting increasing attention, according to statements made recently by the Department of Labor, the WMC, and the WPB. This often overlooked item of time loss due to accidents is considered one of the remaining methods of actually increasing the nation's working force.

According to the WPB a production total of almost six billion dollars worth of munitions a month must be achieved during the last three months of 1944, meaning that the high September level must still be increased.

"Increased conservation of currently employed manpower resulting from increased safety measures and improved industrial health standards cannot fail to be of prime importance in the maintenance of necessary production levels," said J. A. Krug, Chairman of the War Production Board.

The importance of protecting workers now employed is clear when it is realized that in the entire manufacturing field 20 workers out of each 500 employed suffered disabling injuries in 1943. A disabling injury, according to the Bureau of Labor Statistics, is an injury that causes the loss of one full-day or more of the productive capacity of a workman.

Six of the 10 vital war industries surveyed in this report did better than the 20 out of 500 average of all industry. Tank construction, for example, had an average of 12.2 workers injured per 500, and heavy ammunition had an average of 19 per 500 workers.

In stressing the need for manpower conservation in the "must" industries, WPB said that production of heavy trucks, for example, was 7,688 units behind schedule in September output.

Highlighting this urgent manpower need is a statement from the Bureau of Labor Statistics that in 1943 throughout all industry 56,800,000 man-days were lost because of disabling injuries to employed workers.

Average time losses in 1943 per 1,000 workers, including standard time charged for deaths and permanent impairments, and due to dis-

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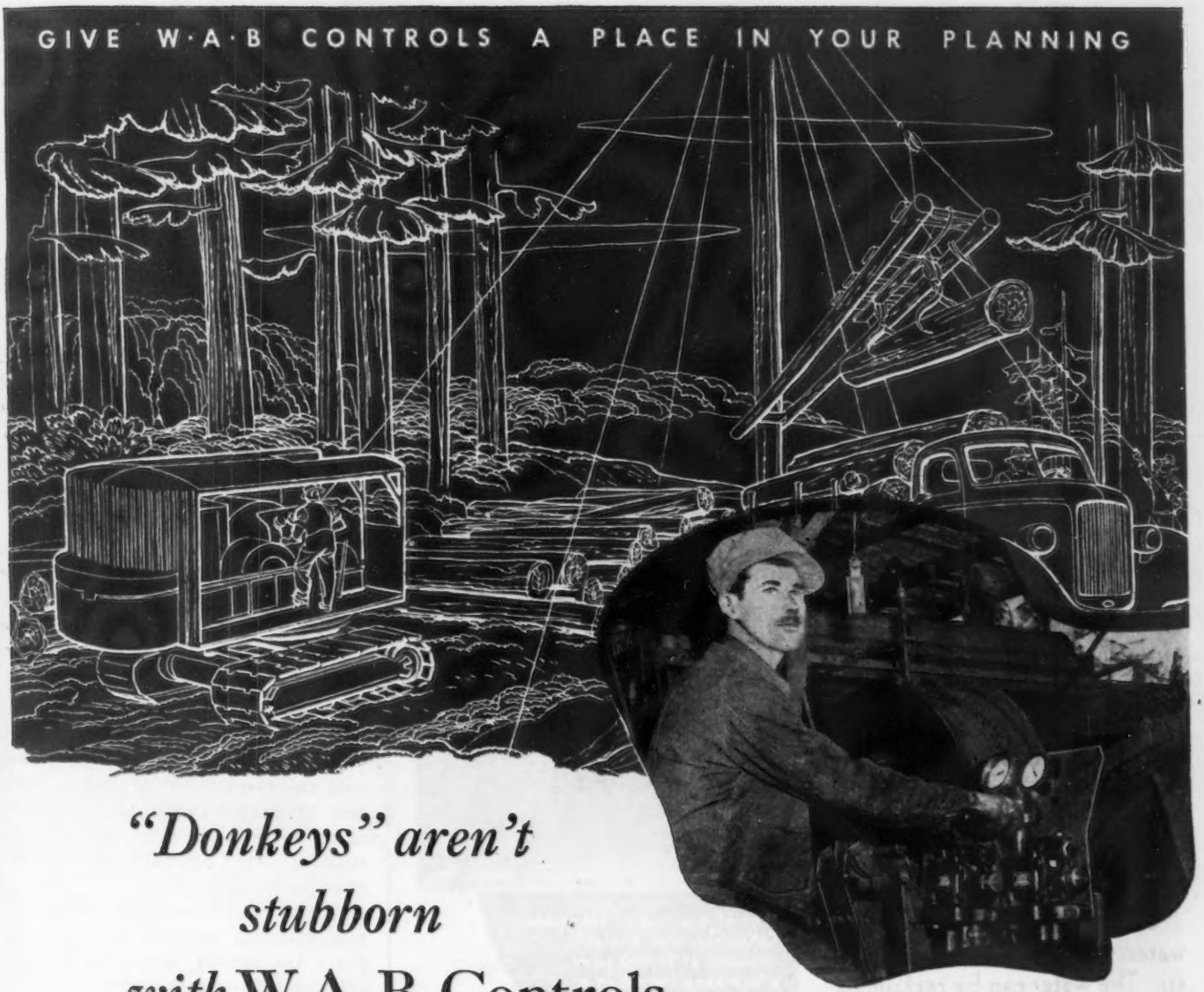

"Donkeys" aren't stubborn with W.A.B. Controls

Paul Bunyan's greatest legendary exploits in juggling mammoth timber are duplicated daily by Donkey engines like this. It's a "never-sweat" job for the operator, for through the magic of air he governs the most complex operations by the movement of two small handles on the W-A-B Controls.

W-A-B devices are handling some of today's most responsible remote control jobs. An entire cycle of operations can be governed merely by positioning small handles. Operator fatigue is lessened, for there is no muscling of heavy levers, whether the operating forces are ounces or tons. Equipment damage is lessened, for interlocks prevent the setting up of opposing actions, and the sequence of operation cannot be accidentally varied.

75 Years of Pioneering

If your post-war products or production involves a remote control problem, you'll find W-A-B Controls a proven answer. Give them a place in your planning.

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remote control systems

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When a Schneible Multi-Wash System is installed in a plant, the dust and fume problem becomes a closed issue. So little attendance and maintenance are required that users forget they have a Schneible; while year after year it maintains the clean air in the working zones, which is so essential to maximum worker efficiency and output.

All costs considered over a period of years, Schneible Multi-Wash Collectors give the highest constant effciency dust control at the lowest overall cost.

Schneible Collectors use plain water to cleanse contaminated air. The water can be reclaimed in Schneible Dewatering Tanks and used over and over again. The collected matter, as sludge, requires far less care and labor for disposal than an accumulation of dust. There are no moving parts in Schneible Collectors—no parts to break, burn, clog, rapidly wear or require periodical cleaning. Once switched into operation, the collector will function indefinitely at constant volume. No other dust control equipment provides all of these advantages.

Schneible Multi-Wash Dust Collectors are available in standard units up to 30,000 c.f.m. for every requirement, from maintaining clean air in an entire plant down to dust control for a troublesome individual operation. Write for informative bulletins.

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abling work accidents, occurred as shown in the following table:

Industry	Days Lost per 1,000 Workers
Rubber Tires	2,549
Motor Vehicles	2,477
Tanks	632
Guns and Related Equipment	2,778
Ammunition, except for small arms	4,054
Shipbuilding and Repair	3,792
Logging	29,072
Miscellaneous Lumber Products (not including furniture or containers	5,983
Cotton Goods	2,103
Canning and Preserving	3,136

It is seen that, out of these industries now vital to America's war effort, only tank construction had a work loss less than one day for each worker, while at the other extreme, more than 29 days were lost for each worker in the entire logging industry during the year.

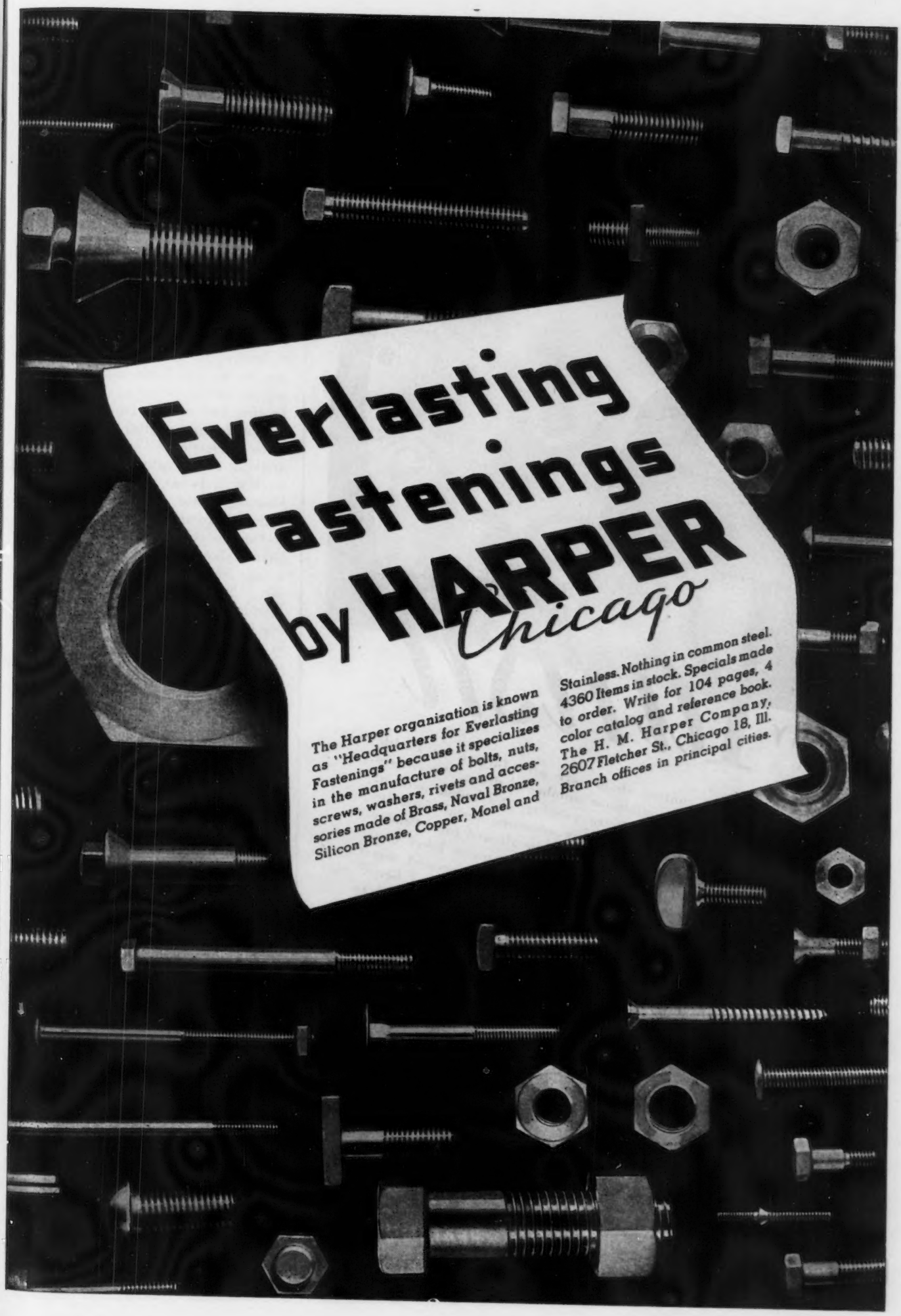
Basic causes of high injury rates, said the Department of Labor, were lack of proper safety training, lack of adequate supervision, and lack of suitable and effective mechanical guards.

In general, according to the Industrial Hazards Division of BIS, accidents are usually traced to (1) the existence of unsafe working conditions; (2) the commission of an unsafe act by some individual; and (3) a combination of these accident-producing factors.

Poor "housekeeping," to cite an example, accounted for 13 per cent of shipyard accidents in 1943. A shipfitter, stepping down for a ladder, placed his heel upon a welder's line that was lying at the base of the ladder. His ankle turned, throwing him off balance, and he fell upon a metal angle, which was also lying close to the ladder. Under proper "housekeeping" conditions this accident could not have occurred.

Unsafe working conditions are being eliminated, the Department of Labor reported, by providing adequate personal safety equipment; by improving "housekeeping" in and around all work places; by regular inspection of tools, materials and equipment; and by the use of proper guards for machinery and equipment.

Unsafe personal acts are being eliminated by making sure that workers and supervisors understand the need for safety equipment, and by enforcing the use of such equipment.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Mexican Industries Grow During Wartime

New York

• • • The war has advanced Mexico's industries greatly according to reports from that country. For the first time the country has its own blast furnaces, tinplate and sheet mills. The steel industry has doubled. Chemicals are made in more than 100 factories, large and small, established since 1942. Wool, leather and textiles are being exported. Dehydration plants multiply. Recently, manufacturing has been contributing some 1½ million pesos to Mexico's yearly production as compared with about 700 million pesos from agriculture and another 700 million from mining.

New foreign capital has gone into these industries. A year ago it was arriving at the rate of some $600,000 weekly; between October, 1940, and February, 1943, it totaled some $100 million. Commercial deposits nearly trebled in three years. Investments have centered mostly in the industrial areas, including Monterrey, Guadalajara, Tampico, Veracruz, Cordoba, Merida, Puebla, and, of course, booming Mexico City. The new money has been helping to finance lumber, mining, shoe manufacturing, construction companies, swanky night clubs, magazines and business papers, homes, apartments, and expansion and improvements in previously established Mexican firms.

But since the Mexican Government's decree of July, 1944, placing most foreign investment under Government control, many foreign businessmen feel uneasy. Recently, North American bankers have been pooling funds for Mexican ventures. Yet Mexicans say they welcome foreign money seeking enterprises in partnership with Mexican capital and Mexican participation in administration.

Tomorrow's investments will concentrate on Mexico's two greatest needs; better land-use and transportation. Industries now rest on a crumbling agriculture. The land and its use are the country's greatest weakness and greatest potential strength. If Mexico masters her Good Earth, she may move far toward self-sufficiency. If she fails, she faces only trouble. Her two major post-war tasks are greatly to increase acreage yields, and to get supplies and labor to the farms and take crops out—which means roads and railways. In some states 64 per cent of all communities can to-day be reached only

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If you need MACHINING FACILITIES . . .

. . . the large machining and turning equipment and personnel of the Barium Steel Shops are now available for your work . . . and the harder the job, the more we welcome the opportunity to serve you.

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Melting Facilities consist of several open hearth furnaces up to 35 tons in size . . . now melting and meeting all analyses of carbon and a range of alloy steels to the critical tests of United States Government and airplane industry specifications. We are pouring ingot sizes up to 42" diameter, and 40,000 lbs. in weight.

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Producers of Carbon, Alloy and Stainless Steels · Heavy Forgings

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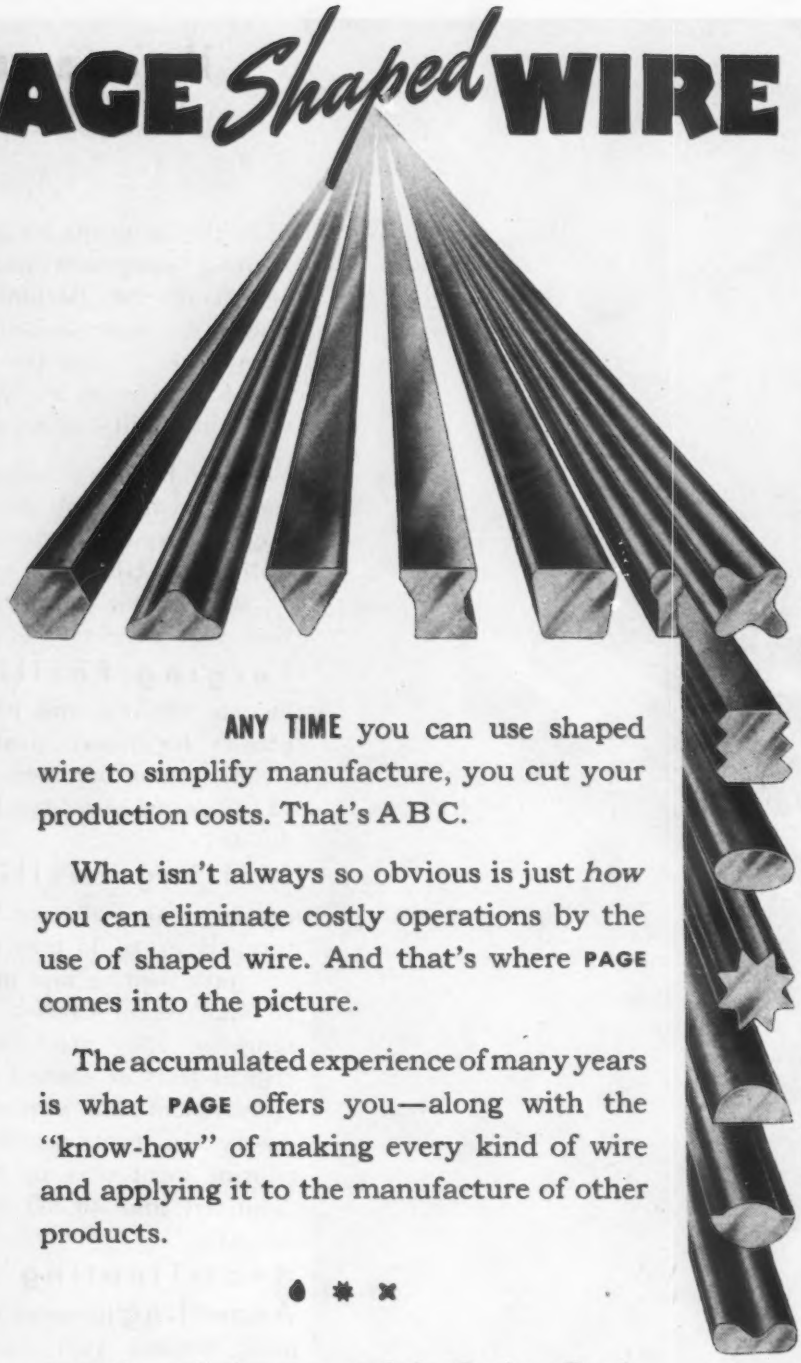
PAGE *Shaped* WIRE



ANY TIME you can use shaped wire to simplify manufacture, you cut your production costs. That's A B C.

What isn't always so obvious is just *how* you can eliminate costly operations by the use of shaped wire. And that's where **PAGE** comes into the picture.

The accumulated experience of many years is what **PAGE** offers you—along with the "know-how" of making every kind of wire and applying it to the manufacture of other products.

* * *

PAGE shaped wires are made in Carbon Steels, Armco Ingot Iron, Stainless Steels in end-sectional areas up to .250" square and in widths up to ⅜ inches.

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by mule trails unfit even for ox carts. Though Mexico is larger than Germany, France, Spain, and Italy combined, she will never till more than one-eighth of her total area. And even this will require millions in investment for reservoirs, hydroelectric dams and plants, irrigation canals, drainage ditches and the clearing of immense jungles. In 1930, only some 56,000 square miles of the country was fit for ploughing, and of this only 3.6 per cent was tilled—an area a little larger than Eire, some 17½ million acres. This cropland might support Mexico's people fairly well, were the peasants not bound to Stone Age methods of farming. But their primitive techniques have combined with the land's ill-distributed rainfall and depleted soils to create what may easily become a major land crisis.

All this will help. But land reclamation must be accompanied by a revolution in transportation, which has all but broken down. Since the time of Diaz, who built 18,640 kilometers of railroad during his 30-year reign, Mexico has added only some 700-odd kilometers to her main lines. The potential wealth of some of her richest states lies untouched and almost unknown for lack of rails. Mexican experts estimate that for every peso invested in the railroad industry up to 1900, some 13 pesos were added to the total public wealth. To bring every spot within 40 kilometers of a railway, the country must have at least 50,000 kilometers of main line tracks. Rehabilitation has begun, but on an insignificant scale — recently the Federal Government provided some 350,000 pesos to recondition rights of way and rolling stock on its Kansas City, Mexico and Orient Railway, connecting Chihuahua and Sonora, and linking with American railroads at the border.

The government — and only the government — can make headway in Mexico's two great postwar problems. But can it find the money for such vast rehabilitation? If not, the last hope is barter. The brilliant and busy Constantine Oumansky has recently opened Soviet headquarters for the Western Hemisphere in Mexico City. It may be that Russia will help.

Pittsburgh Coke's Net Income

• • • **Pittsburgh Coke & Chemical Co.** reports net income for the third quarter of $85,280 with net income for the first nine months of 1944 $302,707. Gross sales for the third quarter were $4,656,440, while the first nine months' sales were $14,408,021.

FENN FOR SPECIAL MACHINERY

FENN FOR SPECIAL TOOLS

FENN FOR SPECIAL PARTS

Reconversion to peacetime production is the problem that every manufacturer faces. Plans may necessitate redesigning present machines and building new ones. There is no time to waste.

The survival of many plants will depend largely upon the careful planning that they do now for machines and tools to be used in postwar production.

When you engage FENN to build your special machinery you gain the benefit of their sound practical shop experience, their knowledge of machine design which has been accumulated through *three generations.*

Fenn Engineers invite inquiries from concerns who are looking for ways to make their product better, faster, or for less money — concerns that are ready to talk about production at a profit.

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Hartford, Connecticut

Builders of Better Machinery To Meet New Demands

WHISPERING CAMPAIGN

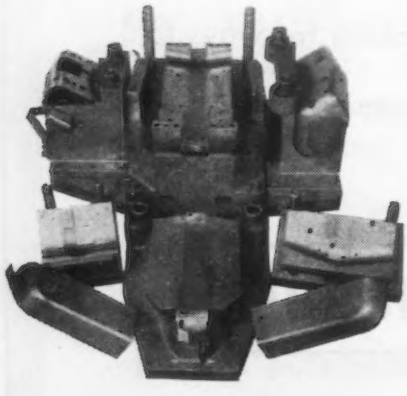
Word of mouth travel has built up a list of almost 1,000 users of Strenes metal ranging over 36 states, employing this unusual alloy in many ways.

Its principal use is for drawing and forming dies . . . body tops, fenders, radiator grills, hoods, lamps . . . refrigerator tops, sides, doors, trays . . . stove parts, tractor parts, farm implement parts, caskets, grave vaults, etc.

Strenes can be cast very close to shape (usually 1/16") . . . thereby greatly reducing machining time. Its graphitic lubrication rate is very high, hence runs of 1,000,000 deep draw parts are not unusual.

Here is an alloy you should look into and we are ready to cite hundreds of plants for you to contact on the subject.

Also . . . no matter how extensive your tooling program Advance has the capacity to handle the casting end and give you excellent service.



THE ADVANCE FOUNDRY CO.

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Steel Prices Compared with British

• • • **The Metal Bulletin**, London, has worked out a comparison of pig iron and steel prices based upon the fixed rate of exchange between dollars and sterling of $4.00 to the pound. The comparison seems to show that all steel prices are considerably lower in the United States and, to a lesser extent, pig iron. However, it is pointed out that there are a number of factors that make direct comparison difficult.

A study of the Lisbon money market by the *Metal Bulletin* suggests that free sterling-dollar exchange is at the rate of $3.60 to the pound. This would serve to increase apparent differentials between British and United States steel prices. On the other hand British prices do not contemplate additional charges for finishing and exceptions to the schedule. Moreover, the British in most instances show delivered prices whereas our schedule calls for a basing point price plus freight and 3 per cent freight tax.

COMPARISON OF STEEL PRICES

	American				British
	U. S. Currnecy	£ equivalent at $4 to £1			(per long ton)
Foundry pig iron	$24 per long ton	6	0	0 per long ton	6 3 0*d/d Cleveland Zone
Basic pig iron	$23.50 per long ton	5	18	0 " "	6 0 6 d/d all districts
Sheet bars	$34.00 per long ton	8	10	0 " "	12 2 6 d/d
Structural shapes	2.10 cents per lb.	11	15	0 " "	14 13 0†d/d N. E. Coast
Heavy rails	$40 per long ton	10	0	0 " "	14 10 6 f.o.t. works
Plates	2.10 cents per lb.	11	15	0 " "	15 8 0†d/d N. E. Coast
Hot rolled sheets	2.10 cents per lb.	11	15	0 " "	17 7 6 d/d N. E. Coast
Galvanized sheets	3.50 cents per lb.	19	12	0 " "	26 2 6 d/d
Tinplates	$5 per basis box (100 lb.) f.o.t.	1	0	0 per basis box (100 lb.) f.o.t.	1 9 9 max., f.o.t. per basis box (108 lb.)

†Allowing 15s rebate. *Allowing 5s rebate.

High Costs May Hamper Reconversion Trends For Pressed Metals

New York

• • • **With the pressed metal industry** expected to turn out about one-half billion dollars worth of goods this year, of which probably more than 66 per cent will be for military use, leaders of this group are anxiously scanning postwar possibilities.

Reconversion of the industry will be divided into two distinct periods: (1) The quick conversion to the production of consumer goods by prewar methods and tools, and (2) the long term conversion which involves applying to postwar the new techniques and methods developed in the production of war materiel.

Both of these reconversion operations are of the utmost importance to industry, to labor and to the consumer, and both must be accomplished with facility if the stamping industry is to maintain its position of leadership in postwar economy.

WPB Industry and Facility Branch in *Facts for Industry* released September 5, 1944, states that the shipments of stamped and pressed metal products for the first quarter of 1944 was $120,365,000 of which, 66.6 per cent was for military use. Reports from leaders in the industry indicate that on an annual basis this is three to five times the prewar figure.

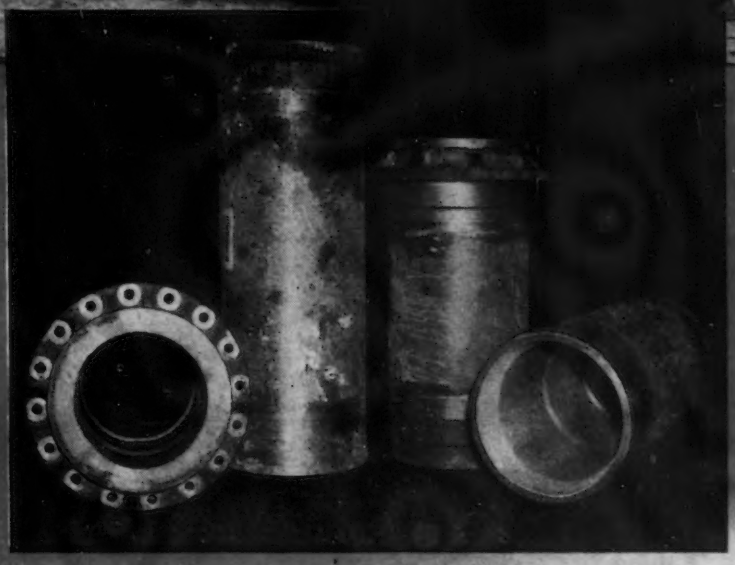
The industry which is aware of the contribution it can make to postwar economy, is cooperating closely with WPB and OPA through Industry Advisory Committees. The Pressed Metal Institute is studying the problems intensively with a view toward speeding up reconversion on the basis of maximum use of the knowledge and experience gained. Among problems being considered at this time are taxes, price restrictions on postwar goods, modernization of plants, tools, and methods, and use of war time developments to best advantage.

Stampers, it is said, can within a few days or at the most a few weeks, begin production of postwar consumer goods using present press equipment and old tools. It will be necessary to dispose of dies, tools, fixtures and even machines and raw materials used for war orders. Normal business cannot be resumed, it is said, until these items are moved off floors or out of warehouses. The speed at which this program can be accomplished is dependent upon the facility with which war contracts and sub-contracts can be settled.

The industry argues that it can do everything in the first postwar year that it has done before but adds that the cost will be increased. This increase is primarily due to higher material and labor costs.

Most plants, it is claimed, can-

Something for the Boys at the INVASION BEACHES



As of the present, we've turned out a huge tonnage of work for Army Ordnance and the Navy. Some of the castings were so big you'd hardly believe it when you saw them—others, like the rudder post and stern tubes for naval craft illustrated here, were less imposing in size. But, big or little, all were equally important, and all partook of the qualities of correct analysis and grain structure, clean sound strength and dimensional accuracy that are characteristic of PSF castings at any time, and for any purpose. Include "Castings by PSF" in your coming plans.

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not immediately put into practice the improved methods and techniques learned during the war as many will be faced with a heavy overhaul and conditioning program. Tools and presses have been abused, and in many instances have not been properly serviced. Presses have been used on work beyond their rated capacity.

It is estimated that it will take a year to get all the equipment back into first-class condition. In the opinion of leaders in the pressed metal industry, if high costs cannot be absorbed (and this, it is said, would be difficult, if not impossible under present conditions) stampings made during the first postwar year with prewar techniques would call for higher prices.

There have been relatively few new general purpose presses added to shop equipment during the war. However, considerable numbers of single purpose presses that have been installed in some plants will have to be disposed of or moved. Single action long stroke presses used to produce shell cases are typical. The surplus machinery problem in the industry is not a major one however. In most plants raw material inventories will not impose a serious problem.

The major reconversion problem facing the pressed metal industry is the necessity for utilizing in the production of consumer goods, all the methods, techniques, short cuts, new design and engineering approaches, that have been developed during the war. This phase of reconversion rests primarily on the shoulders of engineers and scientists of the industry who during the past years have been thinking only in terms of implements of war.

It will require time for these planners to develop consumer goods incorporating the advantages of war production experience. New approaches must be made to the production of old products. Plants must be rehabilitated, new presses secured and new tools designed so that two or more pieces can be made where one was made before. Many prewar tools will no longer be satisfactory and new ones must be substituted. Equipment for welding, brazing and inspecting will have to be selected and installed. These and similar items constitute the major reconversion problem.

At least a year, will be needed to work these problems out, it is said. At the end of this period it is anticipated that new and better methods will reduce manufacturing costs and provide the consumer with better goods at a lower cost which is the prime goal of the industry.

The pressed metal industry is eager to meet civilian requirements at the earliest possible moment in order that employment may be provided for labor, and goods made available to consumers. It also recognizes its responsibility to improve its production methods and lower the cost of consumer goods in the interest of mass production. All this will require large capital expenditures and the stamping industry is seeking the cooperation of the government to the end that sufficient profits will be allowed to make these results possible.

Army Vehicle Excess Suggested for Road Construction Program

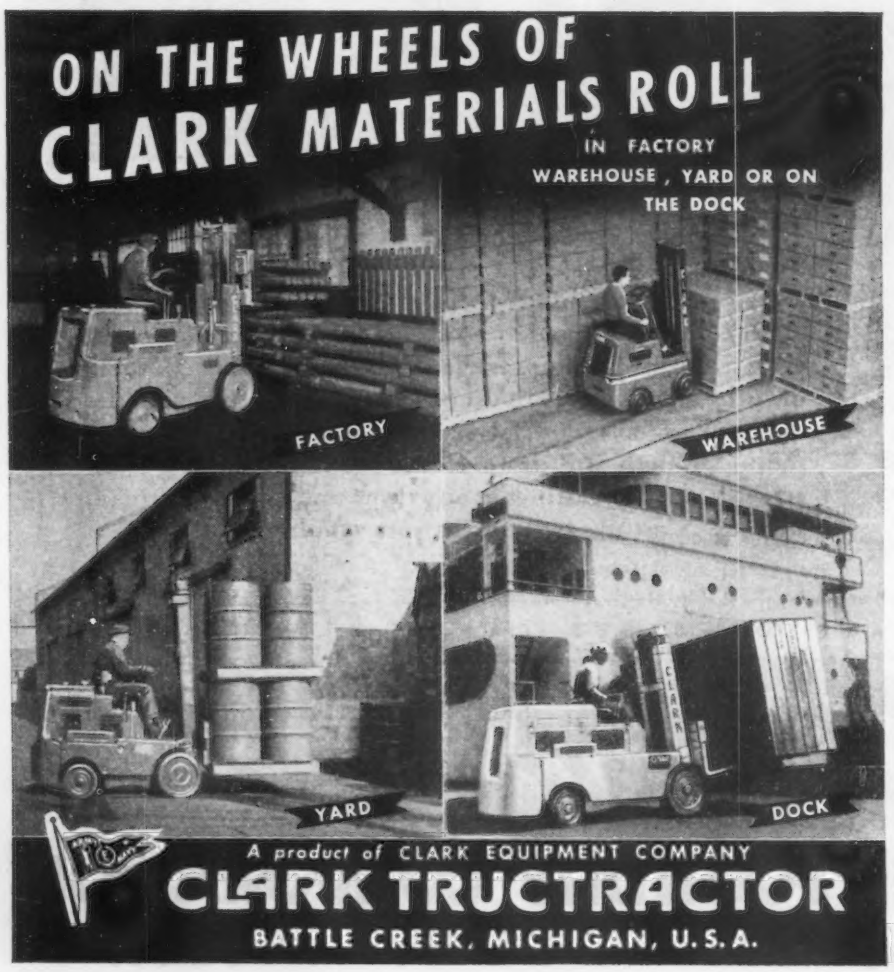
Detroit

• • • A plan to use America's surplus military equipment, trucks, tractors, power shovels, jeeps and bulldozers, to build and repair roads for the "unprecedented era of touring which will inevitably follow the war," was advanced here recently by Joseph W. Frazer, chairman of Graham-Paige Motors Corp.

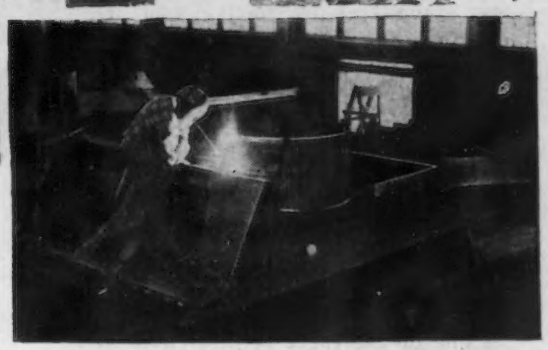
Declaring that "the nation, wherever possible, should put its extra war weapons to work on jobs that will benefit the public," the auto executive pointed out that millions of miles of roads and highways can be reconditioned with this equipment at a minimum cost to the taxpayer.

He said that "a great deal of work will be necessary to prepare the nation's roads for the vast amount of motoring which will logically come in the postwar period, since many highways have fallen into a bad state of repair during the war as a result of the shortages of labor and equipment. In addition, the increased volume of traffic will undoubtedly require the construction of hundreds of new super-highways."

Mr. Frazer suggested that this war material could be used either by the government itself or furnished on a "lend-lease" basis to the various states. It could be allocated, he added, through a number of pools set up at strategic points throughout the nation.



Because of its outstanding welding ability, General American Plate & Welding Division was selected early in the war to weld M4, and later M7-B1 tank hulls. This proven ability, now devoted to war-time production, will be available for your peacetime needs.



Welding M7-B1 tank destroyer hulls at the General American Transportation Corporation, Sharon, Pa., plant.

GENERAL AMERICAN TRANSPORTATION CORPORATION

GATX GENERAL AMERICAN
PLATE & WELDING DIVISION
PLANT AT SHARON PA.

Plate & Welding Division — Sharon, Pennsylvania

Specialists in plate fabrication—manufacturers of pressure vessels of steel, alloys and aluminum—all classes of welding—process equipment of all types—chemical engineering laboratories and service—completely equipped field erection department.

MACHINE TOOLS

. . . News and Market Activities

Krug Says Machine Tools Critical in Shell Making Program

Cleveland

• • • Julius A. Krug, WPB chairman, landed in town last week to confer with local industry and labor on the pressing problem of production.

At his press conference, the morning following a hazardous plane trip from Chicago which included a forced landing at South Bend after a motor went dead and a heatless cabin the rest of the way, Mr. Krug proceeded to make a few statements, hardly startling, but boding ill for the reconversion hopes machine tool makers here have been nurturing for months.

Speaking of the heavy shell program, admittedly one of the worst from a production standpoint, Mr. Krug remarked that "the real heat must be put on the machine tool industry, not the shell producers."

With at least one of the three local companies producing for the heavy shell machinery program, up to schedule, Mr. Krug could have added that earlier in the war effort output was stepped up by placing pool orders; in other words, machines were built on the assumption that they would be needed, and some of them were not used up. As a result, at the start of the heavy shell program planners refused to authorize this and builders couldn't begin turning out machine tools until contractors were found to make the shell and weeks were lost in getting started.

"Cleveland," said affable Mr. Krug, "is one of the three pivotal cities in our war production program. With Chicago and Detroit, it must share a major portion of the burden which calls for a production program of $5,700,000,000 a month, highest since the war began."

Meanwhile, local machine tool men who had heard that song before, waited impatiently for someone, perhaps Mr. Krug and Company, to help them do two things: first, get more men into their plants; second, prevent Selective Service from making any further inroads into skilled worker ranks.

Substantiating this, one company, now 30 days behind schedule, anticipates that new draft quotas will soon take another 200 men to the armed forces, which will put them 90 days in arrears. Labor turnovers are running as high as 30 per cent in some cases, and with permission to raise denied because of ceiling increases that would necessarily follow, some machine tool men here smiled grimly while Mr. Krug continued to stress the "cooperation of management and labor." WMC's referred personnel proved almost entirely unsuited for precision work, it was recalled by machine tool men.

At the same time, War Mobilizer Byrnes' remarks on spot authorization procedures and the production of civilian supplies had the machine tool industry here speculating on reconversion's fading in the near future and wondering just how much postponement might be necessary.

Also, makers kept an ear cocked for further news of the negotiations pending for more than $110,000,000 worth of machine tools lend-leased to the British. Needless to say, the government's request that the tools not be re-exported without its consent has occasioned more than one sigh of relief locally. Naturally, the sale of the machines to the British would be a fine idea for us, even though England has only about 25 per cent they want to keep, and would be glad to pay for another third or 40 per cent they can use, but could make themselves or get along without. But the residue; they don't know what to do about it, either.

Some Cleveland firms are still turning down Russian business on the fairly sound premise that they might get loaded up with it and prevented from getting in some good licks on the U. S. market, whenever it opens. One executive said that his company had produced almost 17 years' normal production in the last two and a half years, and already are scheduled to ship more than 50 per cent over a normal year's business in the next 12 months.

Egyptian Machinery Orders Being Placed In American Plants

New York

• • • Egyptian delegates at the International Business Conference at Rye, N. Y. (see page 89) revealed that negotiations have just been completed in this country for $4,000,000 worth of textile machinery for a complete factory to be located in that country. It was indicated that orders will be placed for additional machines here as long as present delivery dates prevail, but that the United Kingdom will again get the business for lathes and other machines of standard types in the postwar period.

Instructions left with Egyptian representatives here call for the immediate placement of contracts for tools wherever they can be located. According to one of the conference delegates, present conditions in England make necessary delivery promises stating "two years after the end of hostilities." In comparison to this, American firms are promising delivery in 11 to 12 months. The only country beating that promise is Switzerland, who are offering machine tools "ready for shipment from our . . . works within six months from order date." The presently insoluble transportation problem is of course precluding such trade.

The new industrial plants of Egypt, started during the war and in the two years previous to it, were active in production of small items for the British Army during the dark days of the African campaign, but this work has been completed today. It consisted of the production of repair parts for tanks and mobile equipment, land mines, and other small ordnance items.

Postwar needs, particularly acute in the case of housing should raise steel imports in the first year after the war to a total of 300,000 tons, from a prewar high of about 100,000 tons.

There is still considerable discussion of development of ore mines in upper Egypt, but demands of present owners are considered to be exorbitant, especially since they have not been worked sufficiently to prove their value. Despite large reported ore deposits, a complete lack of coal in the country makes it necessary to ship from England.

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NON-FERROUS METALS

. . . News and Market Activities

Copper Stockpile Growing at Fast Rate

• • • Copper stocks are being accumulated at an accelerating rate. According to WPB statistics published in THE IRON AGE for Nov. 16, 1944, surpluses for the second and third quarters of this year amounted to 4000 tons and 57,400 tons, respectively. WPB estimates that an additional 138,600 tons of copper will be accumulated up to the middle of 1945.

It was recently reported that refined copper in Metals Reserve Co. stocks totaled only 305,500 tons in August. Assuming the accuracy of WPB surplus forecasts, by the middle of 1945 this would represent an increase of approximately 60 per cent over the present copper stockpile.

WPB has made some tentative moves toward relaxing restrictions as to civilian applications of copper. However, the tonnage of metal involved is insignificant in comparison with the quarterly increments to surplus. Most recent move in this direction is an additional allotment of 8015 tons of brass and bronze for civilian requirements. This is in addition to a similar allotment by relaxation of restrictions about a month ago.

It is quite probable that as WPB forecasts of copper surpluses prove out, increased quantities may be released for civilian consumption. However some industry members believe that the shortage of labor is the real cause of WPB's reluctance to release more copper.

The report of the Copper Institute for October shows that deliveries in that month increased to 126,590 short tons from the September low. Stocks of fabricators have apparently reached minimum working levels.

In view of the increasing supplies of copper, there is a belief in some quarters that government agencies are studying the advisability of limiting foreign imports or the application of the premium price plan to copper. No announcement has been made of the results of any study that may have been made by government, even with respect to the extra premium payments applying to copper.

The results of the discussions of the British government with Empire copper producers have not yet been announced. However, it is significant that the contracts that are being terminated are for the purchase of copper at relatively low prices. It is quite probable that world copper prices may be affected by these discussions.

•

Lithium

• • • Restrictions on the use of lithium have been removed by recent WPB revocation of order M-191. Dr. Hans Osborg of Lithaloys Corp. New York City, says that lithium and its compounds are utilized in the production of high conductivity copper castings, tin bronzes and silicon bronzes, in the welding of aluminum, and in the melting and pouring of magnesium. In the nonferrous foundry lithium is used for its affinity for oxygen and hydrogen, and as a scavenger of non-metallic impurities. Lithium compounds are also used for heat treatment.

Lithium, which is 1/5 the weight of aluminum, occurs more plentifully than either lead or tin. The richest known deposits are located in South Dakota and North Carolina. Lithium is extracted from its ore as carbonate, from which other lithium salts are produced. Metallic lithium is produced by fused electrolysis, a process similar to that used in the production of aluminum and magnesium.

•

Aluminum Anodized Finishes

• • • The Reynolds Metals Co. is now engaged in the development work required to permit postwar marketing of its products with anodized coatings when ordered.

•

Army Flies Aluminum Drums

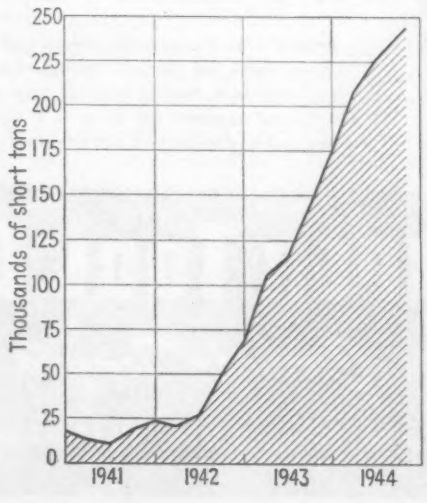
Pittsburgh

• • • Aluminum aviation gasoline drums weighing 21 lb., as against 52 lb. for steel drums of equivalent capacity, are being used to fly gasoline over the Burma hump to the 14th and 20th Air Forces. Their origin lies, possibly, in an ordinary aluminum beer keg, harking back to the scrap collecting days of a couple of years ago.

This did not prove practical, but when Lt. Col. Walter Palmer of the Supply and Services division and former representative of an oil company in the Orient, recalled the incident, engineers of the Aluminum Co. of America and the Aluminum Cooking Utensil Co. were asked to help in the oil and gasoline shipping problem.

The American Transport Command, for whom the containers are built, offered no specifications, but requested the construction of the most efficient and lightest container capable of taking rough treatment. After tests in both the United States and in the China-Burma section, the drums were accepted and are now being produced by Alcoa in quantity.

• STOCKS OF SLAB ZINC *in the United States at the end of the quarter. Statistics from the American Zinc Institute.*



Monarch Tool Pays 50c

Sidney, Ohio

• • • Directors of Monarch Machine Tool Co. declared a dividend of 50c. a share, a reduction of 25c. from payments made in the first three quarters of this year. During 1943, the company declared four dividends of 75c. each. The dividend is payable Dec. 1, to stockholders of record, Nov. 24.

Primary Metals

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, del'd. (Min. 10,000 lb.)	15.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars per lb. contained Be	$17.00
Cadmium, del'd.	90.00
Cobalt, 97-99% (per lb.)	$1.50 to $1.57
Copper, electro, Conn. valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Gold, U. S. Treas., dollars per oz	$35.00
Indium, 99.5%, dollars per troy oz.	$4.50
Iridium, dollars per troy oz.	$165.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9 + %, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb. flask, f.o.b. New York	$108 to $110.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65

Remelted Metals

(Cents per lb. unless otherwise noted)

Aluminum, No. 12 Fdy. (No. 2)	8.50 to 9.00
Aluminum, deoxidizing No. 2, 3, 4	6.25 to 9.00
Brass Ingot	
85-5-5-5 (No. 115)	13.25
88-10-2 (No. 215)	16.75
80-10-10 (No. 305)	16.00
No. 1 Yellow (No. 405)	10.25

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.37
Copper, H.R.	....	17.37	....
Copper drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness: 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals; ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 34c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

†*(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)*

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2†

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25
Automobile radiators	7.00
Zincy bronze borings	8.00
Zincy bronze solids	8.00

OPA Group 3†

Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]

OPA Group 4†

Refinery brass	4.75*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys†

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.875
Loose Yellow Brass Trimmings	7.875

Aluminum

Plant scrap, segregated

2s solids	7.50
Dural alloys, solids 14, 17, 18, 24S	2.50
25S	3.00
turnings, dry basis	2.00
Low copper alloys 51, 52, 61, 63S solids	5.00
turnings, dry basis	3.00

Plant scrap, mixed

Solids	2.00
Turnings, dry basis	1.50

Obsolete scrap

Pure cable	7.50
Old sheet and utensils	4.00
Old castings and forgings	3.25
Pistons, free of struts	3.00
Pistons, with struts	1.50
Old alloy sheet	3.00

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	1.50

Mixed, contaminated plant scrap

Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	2.00
Grade 2 borings and turnings	1.00

Zinc

New zinc clippings, trimmings	6.00
Engravers, lithographers plates	6.00
Old zinc scrap	4.75
Unsweated zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.45
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead including cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass Cast, 82-20, elliptical, 15 in. and longer	23½
Zinc: Cast, 99.99, 16 in. and over.	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00-13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz., lots	40.82-41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 89% crystals, bbls.	6.80

SCRAP

Scrap Prices Head Toward Ceiling

• • • **The market this week is following up last week's advances in prices with further advances. It is significant that these increases are in the same districts as last week's activity, thus accrediting the predictions of those who claimed that sizable purchases could not be made at recent lows.**

Pittsburgh prices are heading for the ceiling according to local observers who predict that inside several weeks most grades will be selling at ceilings. No. 1 and railroad heavy melting and compressed sheets are in extremely short supply in this area as judged by a $2 rise this week following 50c. last week. Other Pittsburgh prices are up to a more moderate extent.

There have been price rises in Chicago, Detroit, and Youngstown. Open hearth prices have improved in Cincinnati. Turnings are up New York, and railroad specialties in St. Louis. The only drop in prices has been at Los Angeles in open hearth grades.

•

PITTSBURGH—No. 1 heavy melting scrap is becoming as hard to buy as cigarettes in this area. Its scarcity has forced the price up $2 a ton, while No. 2 only went up 50c. a ton. Yards and dealers are hesitating to sell until after the first of the year, figuring all profit made now will go to the tax collector and, better yet, prices by then may be higher than now. The trend is definitely up, and ceiling prices accompanied by allocations of scrap may be expected soon.

•

CHICAGO—With abolition of dealers' commissions inciting an automatic 50c. increase in prices of all items selling below ceiling, and with sales of selected items at prices above those previously prevailing, the entire list, except for items already selling at ceiling, has moved into higher levels. Most notable was a good sized sale of No. 1 heavy melting steel at $17.75, one dollar above the previous price. This is considered to represent only a 50c. advance, however, because of the general rise effected by the abolition of commissions. Mill sales of No. 1 railroad heavy melting steel have been made to nearby mills at $18.75 and brokers' transactions indicate that the new level will be confirmed by the next local mill sale.

•

PHILADELPHIA — Shipments this week have increased slightly. Most consumers are back in the market and one mill, out last week because of congestion, is planning to return this week, thus adding strength to the scrap situation here. It has become fairly common practice for some mills to place small initial orders followed by repetitive orders during the month. Heavy melting steel scrap continues unchanged in price but there has been a slight increase in the price of low phos plate and billet crops which are now at $18.50 to $19. With shell turnings beginning to come out of industrial plants, the turnings picture is definitely weaker than other items marketable here.

•

CLEVELAND—Substantial sales in the Valley have given the market here sympathetic strength and the appearance of being on the way again. There is no difficulty in covering orders, as enough scrap is being produced to take care of everything, and sales are negligible here with the market more than ever dependent upon the course of the European war.

•

CINCINNATI—Additional purchases of heavy steel grades during the past week reflects a stronger market and another lift to current quotations. As a result, dealers tend to accept material offered with greater readiness. Material is not any too plentiful but so far all needs are being met. Foundry grades are not moving upward with steel grades, but the market has a firmer undertone on all items.

•

BUFFALO—Local purchases of furnace scrap totaling over 15,000 tons in the last fortnight have cleaned up accumulations in dealers' yards. Most of the business was done on the basis of $17 for No. 1 heavy melting and $16 for No. 2, but at least one lot of No. 1 industrial scrap brought $18 a ton this week—an increase of $1—and railroad heavy melting sold at $18.25. Allocation of 2000 tons of Erie and New York Central rails to a Pennsylvania mill for re-rolling contributed a stronger tone to the market and raised dealers' hopes of still higher prices. None of the big mills seems particularly concerned over the outlook for supplies and one intimated that its reserves were being reduced.

•

BOSTON—The pickup in business in heavy melting steel, busheling, borings and turnings noted a week ago has not been maintained. Some of all such materials is moving, but only if in cars on track. Dealers are inclined to hold yard-stored scrap for higher prices, and supplies of shipyard scrap have dried up. Demand for foundry scrap continues far in excess of supply with full ceiling prices maintained.

BIRMINGHAM — Although some indications point to a market return by mills in this area within the next two weeks, there is little current buying activity. Demand is very limited for all grades except blast furnace material. Prices are unchanged.

•

NEW YORK—Despite increased market prices elsewhere, only turnings prices have improved in this area. This is due to the fact that only one buyer is in the market now that the canal season has closed for the winter. However, this mill is reported to be paying $2 a ton more for scrap from New England than for scrap from New York.

•

DETROIT—In the face of dealer reluctance to move stocks, prices rose here this week. Belief that prices will go higher and a desire to hold down profits for tax purposes seemed to underlie the slow movement. Some modest added interest on the part of outside mills is noted lately, but local purchasers continue mostly out of the market.

•

ST. LOUIS—Dealers offerings of scrap iron are moderate. Shipments are slowing down as a result of the weather to recent sales, while steel car axles are off. Railroad lists: Louisville and Nashville, 3100 tons, including 1200 tons of melting steel, and the St. Louis-San Francisco, 10 carloads.

Tools Suffer for Manpower

Cincinnati

• • • **Subcontracting of machine orders continues despite slower war ordering as manufacturers seek to make delivery dates. The situation was thought at the beginning to be only temporarily until the backlog could be worked down, but is being continued by the lack of manpower to operate district plants. Many employers indicate the loss of men to be greater than replacements despite strong efforts of WMC to keep labor flowing to essential plants. Current business continues at satisfactory levels and, while adding to backlogs in a certain measure, reasonably assures full production well into next year. Material strictures also are bedevilling tool builders and appeals are frequent for WPB assistance in expediting tool components.**

[Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages (for ceiling prices see O. P. A. schedule No. 4).]

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.00 to	$18.50
RR. hvy. melting	19.00 to	19.50
No. 2 hvy. melting	16.00 to	16.50
RR. scrap rails		21.50
Rails 3 ft. and under		23.50
No. 1 comp'd sheets	18.00 to	18.50
Hand bdld. new shts.	16.50 to	17.00
Hvy. axle turn.	16.50 to	17.00
Hvy. steel forge turn.	16.50 to	17.00
Mach. shop turn.	10.50 to	11.00
Short shov. turn.	13.50 to	14.00
Mixed bor. and turn.	10.50 to	11.00
Cast iron borings	12.50 to	13.00
Hvy. break. cast	16.50 plus frt.	
No. 1 cupola	20.00 plus frt.	
RR. knuck. and coup.	22.50 to	23.00
RR. coil springs	22.50 to	23.00
Rail leaf springs	22.50 to	23.00
Rolled steel wheels	22.50 to	23.00
Low phos. billet crops	23.50 to	24.00
Low phos.	19.50 to	20.50
RR. malleable	22.00 plus frt.	

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$17.25 to	$17.75
No. 2 hvy. melting	15.75 to	16.25
No. 1 bundles	15.75 to	16.25
No. 2 dealers' bndls.	14.75 to	15.25
Galv. bundles (No. 3)	12.75 to	13.25
Mach. shop turn.	8.00 to	8.50
Short shoveling turn.	8.50 to	9.00
Cast iron borings	8.50 to	9.00
Mix. bor. & short turn.	8.50 to	9.00
Low phos. hvy. forge	20.50 to	21.00
Low phos. plates	19.25 to	19.75
No. 1 RR hvy. melting	18.25 to	18.75
Reroll rails		22.25
Cut rails, 3 ft. and under	21.75 to	22.25
Locomotive tires, cut	19.25 to	19.75
Cut bolsters & side frames	18.75 to	19.00
Angles & splice bars	20.75 to	21.25
No. 3 steel wheels	19.25 to	19.75
Couplers & knuckles	19.75 to	20.25
Miscellaneous rails	19.75 to	20.25
Agricul. malleable	20.50 to	21.00
RR. malleable	21.50 to	22.00
St'dard stl. car axles	23.50 to	24.00
FOB shipping point		
No. 1 mach. cast		20.00
No. 1 agricul. cast		20.00
Cast iron car wheels		20.00
Hvy. breakable cast		16.50
RR. grate bars		15.25
Brake shoes		15.25
Stove plate		19.00
Clean auto cast		20.00

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$16.50 to	$17.00
No. 2 hvy. melting	15.50 to	16.00
No. 1 bundles	16.50 to	17.00
No. 2 bundles	14.50 to	15.00
Mach. shop turn	5.50 to	6.00
Shoveling turn.	7.00 to	7.50
Cast iron borings	7.50 to	8.00
Mixed bor. & turn.	6.00 to	6.50
No. 1 cupola cast		21.00
Hvy. breakable cast		16.50
Low phos. plate	20.00 to	21.00
Scrap rails	20.00 to	21.00
Stove plate	15.50 to	16.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting		$12.50
No. 2 hvy. melting		11.50
Bundled skeleton		11.50
Turnings, shovelings	$4.50 to	5.50
Turnings, regular	4.50 to	5.50
Mixed bor. & turn.	4.50 to	5.50
Mixed alloy turn.	4.50 to	5.50
Clean cast. chem. bor.	12.56 to	14.15
Delivered to fdry. per gr. ton		
Breakable cast	21.57 to	21.87
Stove plate	20.00 to	23.51
Machinery cast, truck	21.00 to	23.51

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	$12.25 to	$12.75
No. 2 hvy. melting	12.25 to	12.75
No. 1 bundles	12.25 to	12.75
New busheling	12.25 to	12.75
Mach. shop turn.	5.50 to	6.00
Short shov. turn.	7.50 to	8.00
Cast iron borings	7.50 to	8.00
Mixed bor. & turn.	5.50 to	6.00
No. 1 cupola cast	19.00 to	20.00
Charging box cast	14.50 to	15.50
Hvy. breakable cast.	13.00 to	13.50
Stove plate	17.00 to	17.50
Flashings	12.25 to	12.75
Low phos. plate	14.50 to	15.50
Automotive cast	19.00 to	20.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$15.50
No. 2 hvy. melting	14.50
No. 2 bundles	13.50
Mach. shop turn.	9.50
Shoveling turn.	$11.00 to 11.50
Cast iron borings	10.00 to 10.50
Mixed bor. & turn.	9.50
No. 1 cupola cast	*20.00
Hvy. breakable cast.	*16.50
Cast, charging box	*19.00
Hvy. axle, forge turn.	16.00 to 16.25
Low phos. plate	18.50 to 19.00
Low phos. punchings	19.00 to 19.50
Billet crops	18.50 to 19.00
RR. steel wheels	19.00 to 19.50
RR. coil springs	19.00 to 19.50
RR. malleable	*22.00

*F.o.b. shipping point.

ST. LOUIS

Per gross ton delivered to consumer:

Hvy. melting		$16.00
No. 1 locomot'e tires	$16.00 to	16.50
Misc. stand. sec. rails	17.00 to	17.50
Railroad springs	18.00 to	18.50
Bundled sheets	13.00 to	13.50
Heavy axle turn	8.00 to	8.50
Machine shop turns		6.50
Rerolling rails		21.00
Steel car axles	21.00 to	21.50
Steel rails under 3 ft.		21.50
Steel angle bars	18.00 to	18.50
Cast iron car wheels		20.00
No. 1 machinery cast		20.00
Railroad malleable	20.00 to	20.50
Breakable cast		16.50
Stove plate		17.00
Grate bars		15.25
Brake shoes		15.25

Note: Cast grades f.o.b. Shipping Point.

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$14.50 to	$15.00
No. 2 hvy. melting	13.50 to	14.00
No. 2 bundles	12.50 to	13.00
No. 1 busheling	11.50 to	12.00
Scrap rails	14.00 to	14.50
Rails for rerolling	17.00 to	17.50
Rails 3 ft. & under	17.00 to	17.50
Angles & splice bars	16.50 to	17.00
Long turn.	4.50 to	5.00
Cast iron borings	6.50 to	7.00
Steel axles	14.50 to	15.00
Stove plate	16.50 to	17.00
Bar crops and plate	16.00 to	16.50
Structural and plate	16.00 to	16.50
No. 1 cast	20.00 to	21.00
Cast iron carwheels	13.00 to	13.50

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$17.00 to	$17.50
No. 2 hvy. melting	16.50 to	17.00
Low phos. plate	19.50 to	20.00
No. 1 busheling	17.00 to	17.50
Hydraulic bundles	17.00 to	17.50
Mach. shop turn.	10.00 to	10.50
Short shovel. turn.	12.50 to	13.00
Cast iron borings	11.50 to	12.00

NEW YORK

Dealers' buying prices, per gross ton, on cars:

No. 1 hvy. melting	$11.00 to	$11.50
No. 2 hvy. melting	10.00 to	10.50
Hyd. comp. black bundles	9.00 to	9.50
Hyd. comp. galv. bundles	7.00 to	7.50
Hvy. breakable cast.		16.50
Charging box cast		19.00
No. 1 cupola cast		20.00
Clean auto cast		20.00
Unstrip. motor blks.		17.50
Stove plate		19.00
Clean chem. cast bor.		14.33
Mach. shop turn.	5.50 to	6.00
Mixed bor. & turn.	5.50 to	6.00

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$16.50 to	$17.00
No. 1 bundles	15.50 to	16.00
No. 2 bundles	14.50 to	15.00
No. 2 hvy melting	15.50 to	16.00
Mach. shop turn	9.00 to	9.50
Shoveling turn.	11.00 to	11.50
Cast. iron borings	10.00 to	10.50
Mixed bor. & turn.	10.00 to	10.50
No. 1 cupola cast	20.80 to	22.50
Stove plate	19.80 to	21.50
Low phos. plate		21.75
Scrap rails	19.00 to	19.25
Rails 3 ft. & under.		22.75
RR. steel wheels		23.75
Cast iron car wheels		20.00
RR. coil & leaf Sprgs.		23.75
RR. knuckles & coup.		23.75
RR. malleable		22.00
No. 1 busheling	15.50 to	16.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$16.00 to	$16.50
No. 2 hvy. melting	16.00 to	16.50
Compressed sheet stl.	16.00 to	16.50
Drop forge flashings	15.50 to	16.00
No. 2 bundles	15.00 to	15.50
Mach. shop turn.	8.00 to	8.50
Short shovel.	11.50 to	12.00
No. 1 busheling	16.00 to	16.50
Steel axle turn.	15.00 to	15.50
Low phos. billet and bloom crops	20.50 to	21.50
Cast iron borings	11.50 to	12.00
Mixed bor. & turn.	10.50 to	11.00
No. 2 busheling	13.50 to	14.00
No. 1 machine cast	20.00 plus frt.	
Railroad cast	20.00 plus frt.	
Railroad grate bars		15.75
Stove plate	19.00 plus frt.	
RR. hvy. melting	18.00 to	18.50
Rails 3 ft. & under	23.50 to	24.00
Rails 18 in. & under	24.75 to	25.25
Rails for rerolling	23.50 to	24.00
Railroad malleable	22.00 plus frt.	
Elec. furnace punch.	18.50 to	19.00

SAN FRANCISCO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$16.00 to	$16.75
RR. hvy. melting	16.00 to	16.75
No. 2 hvy. melting	15.00 to	15.75
No. 2 bales	14.00 to	14.75
No. 3 bales	10.00 to	10.75
Mach. shop turn.		7.00
Elec. furn 1 ft., under	16.00 to	17.50
No. 1 cupola cast	20.00 to	22.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$14.00 to	$15.00
No. 2 hvy. melting	13.00 to	14.00
No. 2 bales	12.00 to	13.00
No. 3 bales	10.00 to	10.50
Mach. shop turn.		5.00
No. 1 cupola cast	20.00 plus frt.	

SEATTLE

Per gross ton delivered to consumer:

No. 1 hvy. melting		$13.50
RR. hvy. melting		13.50
No. 3 bundles		11.50
Elec. furn. 1 ft., und.	$16.00 to	17.00
No. 1 cupola cast		20.00

Comparison of Prices . . .

Advances Over Past Week in **Heavy Type**; Declines in *Italics*. (Prices Are F.O.B. Major Basing Points)

Flat Rolled Steel: (Cents Per Lb.)	Nov. 21, 1944	Nov. 14, 1944	Oct. 17, 1944	Nov. 23, 1943
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs, rerolling	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Nov. 21, 1944	Nov. 14, 1944	Oct. 17, 1944	Nov. 23, 1943
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$25.84
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	25.11	25.11	25.11	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	31.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)	Nov. 21, 1944	Nov. 14, 1944	Oct. 17, 1944	Nov. 23, 1943
Heavy melt'g steel, P'gh.	$18.25	$16.25	$16.25	$20.00
Heavy melt'g steel, Phila.	15.50	15.50	14.50	18.75
Heavy melt'g steel, Ch'go	17.50	16.50	16.50	18.75
No. 1 hy. comp. sheet, Det.	12.50	12.00	11.25	17.85
Low phos. plate, Youngs'n	19.75	17.75	17.50	22.50
No. 1 cast, Pittsburgh	20.00*	20.00*	20.00*	20.00
No. 1 cast, Philadelphia	20.00*	20.00*	20.00*	20.00
No. 1 cast, Chicago	20.00*	20.00*	20.00*	20.00

*F.o.b. shipping point.

Coke, Connellsville: (Per Net Ton at Oven)	Nov. 21, 1944	Nov. 14, 1944	Oct. 17, 1944	Nov. 23, 1943
Furnace coke, prompt	$7.00	$7.00	$7.00	$6.50
Foundry coke, prompt	8.25	8.25	8.25	7.50

Non-Ferrous Metals: (Cents Per Lb. to Large Buyers)	Nov. 21, 1944	Nov. 14, 1944	Oct. 17, 1944	Nov. 23, 1943
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

The various basing points for finished and semi-finished steel are listed in the detailed price table, pages 140-151.

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943 issue.

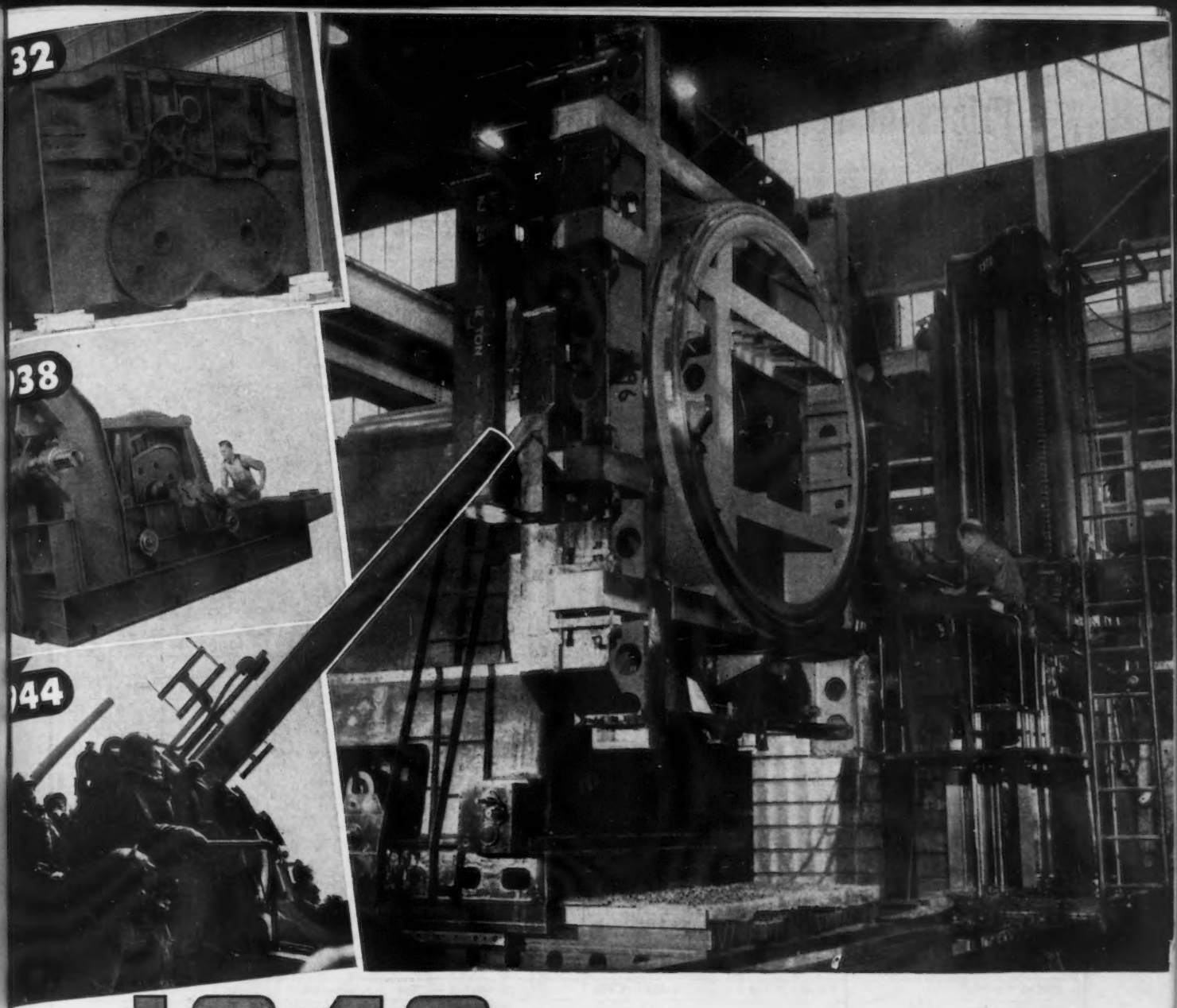
	FINISHED STEEL	PIG IRON	SCRAP STEEL
November 21, 1944	2.30837c. a Lb.	$23.61 a Gross Ton	$17.08 a Gross Ton
One week ago	2.30837c. a Lb.	$23.61 a Gross Ton	$16.08 a Gross Ton
One month ago	2.30837c. a Lb.	$23.61 a Gross Ton	$15.75 a Gross Ton
One year ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	HIGH	LOW	HIGH	LOW	LOW	HIGH
1944	2.30837c., Sept. 5	2.272349c., Jan. 4				
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$19.17, Apr. 10	$22.00, Jan. 7
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	16.04, Apr. 9	21.83, Dec. 30
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	14.08, May 16	22.50, Oct. 3
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	11.00, June 7	15.00, Nov. 22
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	12.67, June 8	21.92, Mar. 30
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	12.67, June 9	17.75, Dec. 21
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	10.33, Apr. 29	13.42, Dec. 10
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	9.50, Sept. 25	13.00, Mar. 13
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	6.75, Jan. 3	12.25, Aug. 8
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	6.43, July 5	8.50, Jan. 12
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	8.50, Dec. 29	11.33, Jan. 6
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	11.25, Dec. 9	15.00, Feb. 18
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	14.08, Dec. 3	17.58, Jan. 29

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.



1947 WHATEVER THE DATE

Welding facilities will provide for the production of welded steel structures beyond the scope of most weld shops in size and precision—after the war.

Machine tool facilities will exceed in size and capacity the usual equipment found in the larger tool rooms —after the war.

We will be glad to get in touch with you or your representatives as to the nature and scope of these facilities—at any time.

DANLY MACHINE SPECIALTIES, INC.

2100 SO. 52nd AVE. CHICAGO 50, ILLINOIS

DANLYWELD

Danly Die Sets • Die Makers' Supplies • Welded Steel Fabrication

Prices of Finished Iron and Steel . . .

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per lb. under base; primes 25c. above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price for annealed, bright finish wires, commercial spring wire.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars[10]	DELIVERED TO Detroit	New York	Philadelphia
Hot Rolled Sheets	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold Rolled Sheets[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized Sheets (24 gage)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling Sheets (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long Ternes[2]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
Hot Rolled Strip[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold Rolled Strip[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage Stock Strip	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R Strip	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
Coke Tin Plate, Base Box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
.25 / .50 / .75 Electro Tin Plate, Box	$4.35 / $4.50 / $4.65	$4.35 / $4.50	$4.35 / $4.50 / $4.65						$4.60 / $4.75						
Black Plate (29 gage)[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[13]			3.37¢
Mfg. Ternes, Special Box	$4.30	$4.30	$4.30						$4.40						
Carbon Steel Bars	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail Steel Bars[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (Billet) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[13]	2.25¢	2.39¢	
Reinforcing (Rail) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	c2.55¢[13]	2.25¢		2.47¢
Cold Finished Bars[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)			(Toledo = 2.80¢)		2.99¢	2.97¢
Alloy Bars, Hot Rolled	2.70¢	2.70¢				2.70¢		(Bethlehem, Massillon, Canton = 2.70¢)					2.80¢		
Alloy Bars, Cold Drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
Carbon Steel Plates	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	(Coatesville and Claymont = 2.10¢) 2.10¢	2.35¢		2.45¢	2.65¢	2.32¢	2.29¢	2.15¢
Floor Plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy Plates	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
Structural Shapes	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
Bright Wire[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)			(Duluth = 2.65¢)		3.10¢			2.92¢
Galvanized Wire	Add proper size extra and galvanizing extra to Bright Wire base.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.52¢
Steel Sheet Piling	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6

Slabs—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. (rerolling) 4 in. sq. or larger $37.75 f.o.b. Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel $47.50.

Blooms—Phoenix Iron Co. (rerolling) $41, (forging) $47; Pgh. Steel Co. (reroll) $38.25, (forging) $44.25. Wheeling Steel Corp. (rerolling) 4 in. sq. or larger $37.75 f.o.b. Portsmouth.

Sheet bar—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging—Andrews Steel Co. $50 basing pts.: Follansbee Steel Corp. $49.50 Toronto: Phoenix Iron Co. $47.00 mill. Geneva Steel Co. $64.64 f.o.b. Pacific Coast; Pittsburgh Steel Co. $49.50.

Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. 4 in. sq. or larger $37.75, smaller $39.50 f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2 $40.60 Kokomo, Ind. (thse prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.60 Birmingham; Ford Motor Co. $34 Dearborn, Mich. Geneva Steel Co. $58.64 f.o.b. Pac. C. Pgt. Steel Co. $43.50.

Structural Shapes—Phoenix Iron Co. $2.35 basing pts. (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing points.

Rails—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp., $45 Pueblo.

Hot Rolled Plate—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. and Geneva Steel Co. $3.20 Pacific Ports; Central Iron and Steel Co. $2.50 basing points; Granite City Steel Co. $2.35 Granite City.

Merchant Bars—W. Ames Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. &Supply Co., $2.35 Chicago; Calumet Steel Div., Borg Warner Corp. (8 in. mill bar) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill. Milton Mfg. Co. $2.75 f.o.b. Milton, Pa.

Pipe Skelp—Wheeling Steel Corp., Benwood, $2.05 per cwt.

Reinforcing Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Mansfield, Mass., f.o.b. Mansfield; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass. f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co. for delivery except Texas and Okla. Chicago, base, f.o.b. Fort Worth, Tex.; Conors Steel Co. shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

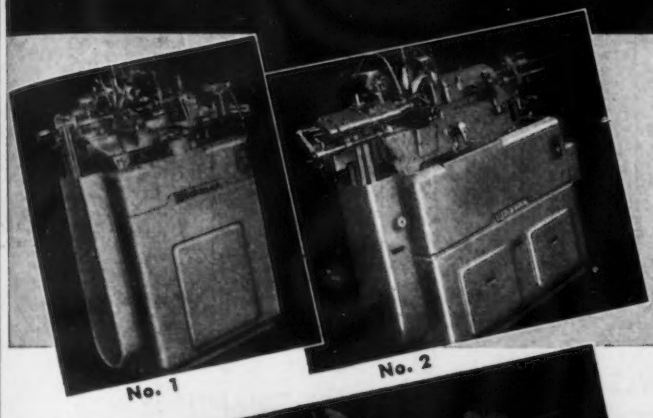
Galvanized Sheets—Andrews Steel Co. $3.75 basing pts.; Parkersburg Iron & Steel Co. $3.85 Parkersburg; Apollo Steel Co. $3.75 basing pts.; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill is $2.45 per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

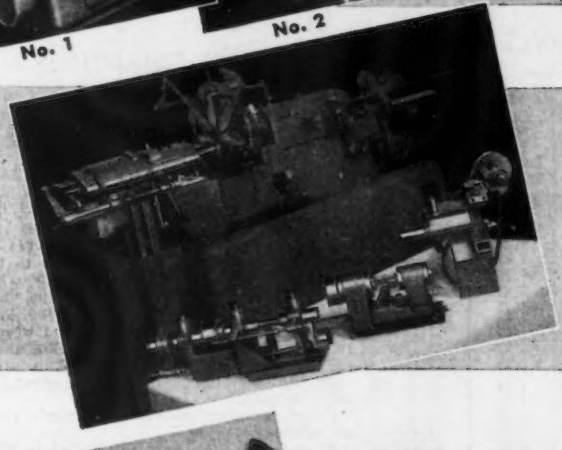
FOR PRODUCING SMALL PRECISION PARTS FROM BAR STOCK ON A HIGH PRODUCTION BASIS

Wickman MEETS Every NEED



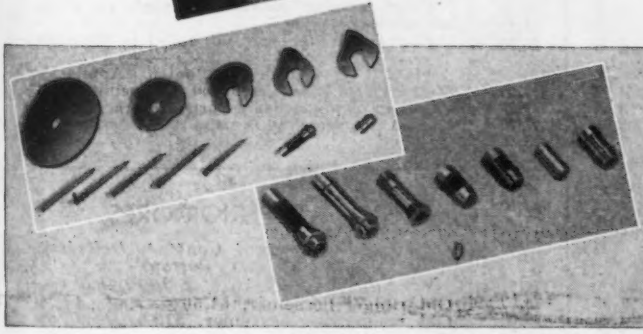
TWO SWISS TYPE HIGH PRECISION AUTOMATICS

Wickman Swiss Type High Precision Automatics are unequalled in the rapid, accurate production of small slender parts such as those for instruments, watches, and other precision mechanisms. They employ the Swiss principle of cam controlled coordinated tool and headstock movements to generate even the most intricate forms with single point tools. The No. 1 machine, accurate to ± .0002", will handle 5/32" and smaller bar stock for parts up to 1 9/16" long. The capacity of the No. 2 machine, accurate to ± .0005", is 1/2" diameter by 4" long.



A FULL COMPLEMENT OF ATTACHMENTS

The complete set of attachments for performing secondary operations on both Wickman Automatics includes a three spindle attachment for drilling, reaming, threading, tapping and similar operations; a high speed drilling attachment; a threading and tapping attachment; a screw slotting attachment; a side milling attachment; and a taper turning attachment for extreme accuracy in long taper turning.



COMPLETE TOOLING SERVICE

We can promptly furnish you with complete tooling including tools, cams, collets and tungsten carbide guide bushings made and tried out under production conditions in our Detroit plant. Thus perfect performance on the job is assured. If you prefer to finish your own tooling, complete stocks of blanks are maintained ready for immediate shipment.

A COMPETENT ENGINEERING STAFF

A capable staff of engineers with wide experience in Swiss Type Automatic work is always at your service. They will process the part, as well as design and make the tools.

If you are producing small precision turned parts, call in a Wickman engineer. Without obligation he will gladly show you where Wickman Swiss Type High Precision Automatics can help in your production.

THE Wickman CORPORATION

15537 WOODROW WILSON AVE.
DETROIT 3, MICHIGAN

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
**Philadelphia	3.518	4.972[8]	5.018a	3.922	4.772	3.605	3.666	3.822	4.072	5.968	7.068	7.272	8.322
New York	3.590	4.613[3]	5.010	3.974[6]	4.772	3.768	3.758	3.853	4.103	6.008	7.108	7.303	8.353
Boston	3.744	4.744[9]	5.224[9]	4.106	4.716	3.912	3.912	4.044	4.144	6.162	7.262	7.344	8.394
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
Chicago	3.25	4.20	5.231	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.85	6.85	7.90
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.087	7.087	8.137
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.056	6.85	7.90
Buffalo	3.35	4.40	4.754	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.85	6.85	7.90
Detroit	3.45	4.50	5.004	3.70	4.659[17]	3.609	3.661	3.45	3.80	6.08	7.18	7.159	8.209
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.347[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.231	7.231	8.281
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	6.85	6.85	7.90
St. Paul	3.51	4.48	5.257[4]	3.86	4.35[17]	3.81[13]	3.81[13]	3.76[13]	4.361	6.09	7.19	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.43	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	8.08	7.18	7.18	8.23
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.965[7]	4.68	3.265	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058*	4.95	5.358	4.308	....	4.158	4.158*	4.108*	4.629	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20[3]	6.10[4]	4.95	5.613[15]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783		9.404		
Portland	4.65[11]	6.60[4]	5.75[4]	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]		6.17[18]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90				

MILL EXTRAS FOR NATIONAL EMERGENCY STEELS

Designation	Basic Open-Hearth		Electric Furnace		Designation	Basic Open-Hearth		Electric Furnace	
	Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs		Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs
NE 1330	0.10¢	$2.00	....	.....	NE 9415	0.75¢	$15.00	$1.25	$25.00
NE 1335	0.10	2.00	....	.....	NE 9417	0.75	15.00	1.25	25.00
NE 1340	0.10	2.00	....	.....	NE 9420	0.75	15.00	1.25	25.00
NE 1345	0.10	2.00	....	.....	NE 9422	0.75	15.00	1.25	25.00
NE 1350	0.10	2.00	....	.....	NE 9425	0.75	15.00	1.25	25.00
					NE 9427	0.75	15.00	1.25	25.00
					NE 9430	0.75	15.00	1.25	25.00
NE 8612	0.65¢	$13.00	$1.15	$23.00	NE 9432	0.75	15.00	1.25	25.00
NE 8615	0.65	13.00	1.15	23.00	NE 9435	0.75	15.00	1.25	25.00
NE 8617	0.65	13.00	1.15	23.00	NE 9437	0.75	15.00	1.25	25.00
NE 8620	0.65	13.00	1.15	23.00	NE 9440	0.75	15.00	1.25	25.00
NE 8622	0.65	13.00	1.15	23.00	NE 9442	0.80	16.00	1.30	26.00
NE 8625	0.65	13.00	1.15	23.00	NE 9445	0.80	16.00	1.30	26.00
NE 8627	0.65	13.00	1.15	23.00	NE 9447	0.80	16.00	1.30	26.00
NE 8630	0.65	13.00	1.15	23.00	NE 9450	0.80	16.00	1.30	26.00
NE 8632	0.65	13.00	1.15	23.00					
NE 8635	0.65	13.00	1.15	23.00					
NE 8637	0.65	13.00	1.15	23.00	NE 9722	0.65¢	$13.00	$1.15	$23.00
NE 8640	0.65	13.00	1.15	23.00	NE 9727	0.65	13.00	1.15	23.00
NE 8642	0.65	13.00	1.15	23.00	NE 9732	0.65	13.00	1.15	23.00
NE 8645	0.65	13.00	1.15	23.00	NE 9737	0.65	13.00	1.15	23.00
NE 8647	0.65	13.00	1.15	23.00	NE 9742	0.65	13.00	1.15	23.00
NE 8650	0.65	13.00	1.15	23.00	NE 9745	0.65	13.00	1.15	23.00
					NE 9747	0.65	13.00	1.15	23.00
					NE 9750	0.65	13.00	1.15	23.00
NE 8712	0.70¢	$14.00	$1.20	$24.00	NE 9763	0.65	13.00	1.15	23.00
NE 8715	0.70	14.00	1.20	24.00	NE 9768	0.65	13.00	1.15	23.00
NE 8717	0.70	14.00	1.20	24.00					
NE 8720	0.70	14.00	1.20	24.00					
NE 8722	0.70	14.00	1.20	24.00	NE 9830	$1.30	$26.00	$1.80	$36.00
NE 8725	0.70	14.00	1.20	24.00	NE 9832	1.30	26.00	1.80	36.00
NE 8727	0.70	14.00	1.20	24.00	NE 9835	1.30	26.00	1.80	36.00
NE 8730	0.70	14.00	1.20	24.00	NE 9837	1.30	26.00	1.80	36.00
NE 8732	0.70	14.00	1.20	24.00	NE 9840	1.30	26.00	1.80	36.00
NE 8735	0.70	14.00	1.20	24.00	NE 9842	1.30	26.00	1.80	36.00
NE 8737	0.70	14.00	1.20	24.00	NE 9845	1.30	26.00	1.80	36.00
NE 8740	0.70	14.00	1.20	24.00	NE 9847	1.30	26.00	1.80	36.00
NE 8742	0.70	14.00	1.20	24.00	NE 9850	1.30	26.00	1.80	36.00
NE 8745	0.70	14.00	1.20	24.00					
NE 8747	0.70	14.00	1.20	24.00					
NE 8750	0.70	14.00	1.20	24.00	NE 9912	$1.20	$24.00	$1.55	$31.00
					NE 9915	1.20	24.00	1.55	31.00
					NE 9917	1.20	24.00	1.55	31.00
NE 9255	0.40¢	$8.00	....	.....	NE 9920	1.20	24.00	1.55	31.00
NE 9260	0.40	8.00	....	.....	NE 9922	1.20	24.00	1.55	31.00
NE 9261	0.65	13.00	....	.....	NE 9925	1.20	24.00	1.55	31.00
NE 9262	0.65	13.00	....	.....					
					NE 52100A	....	.....	$2.60	$52.00
					NE 52100B	....	.....	2.60	52.00
					NE 52100C	....	.....	2.60	52.00

Note 1: The ranges shown are restricted to sizes 100 sq. in. or less or equivalent cross-sectional area 18 in. wide or under, with a maximum individual piece weight of 7000 lb. irrespective of size. **Note 2:** For steels ordered to such ranges, below the size and weight restriction, the average of all the chemical checks must be within the limits specified subject to check analysis variations given in Table 4, Section 10, A.I.S.I. Steel Products Manual. **Note 3:** When acid open-hearth is specified and acceptable, add to basic open-hearth alloy differential 0.25c. per lb. for bars and bar strip and $5 per gross ton for billets, blooms and slabs. **Note 4:** The extras shown are in addition to the base price of $2.70 for 100 lb. on finished products and $54 per gross ton on semi-finished steel, major basing points, and are in cents per pound when applicable to bars and bar-strip, and in dollars per gross ton when applicable to billets, blooms and slabs. The full extra applicable over the base price is the total of all extras indicated by the specific requirements of the order. The higher extra shall be charged for any size falling between two published extras.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb. base; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

(a) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271c. for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

FLUORSPAR

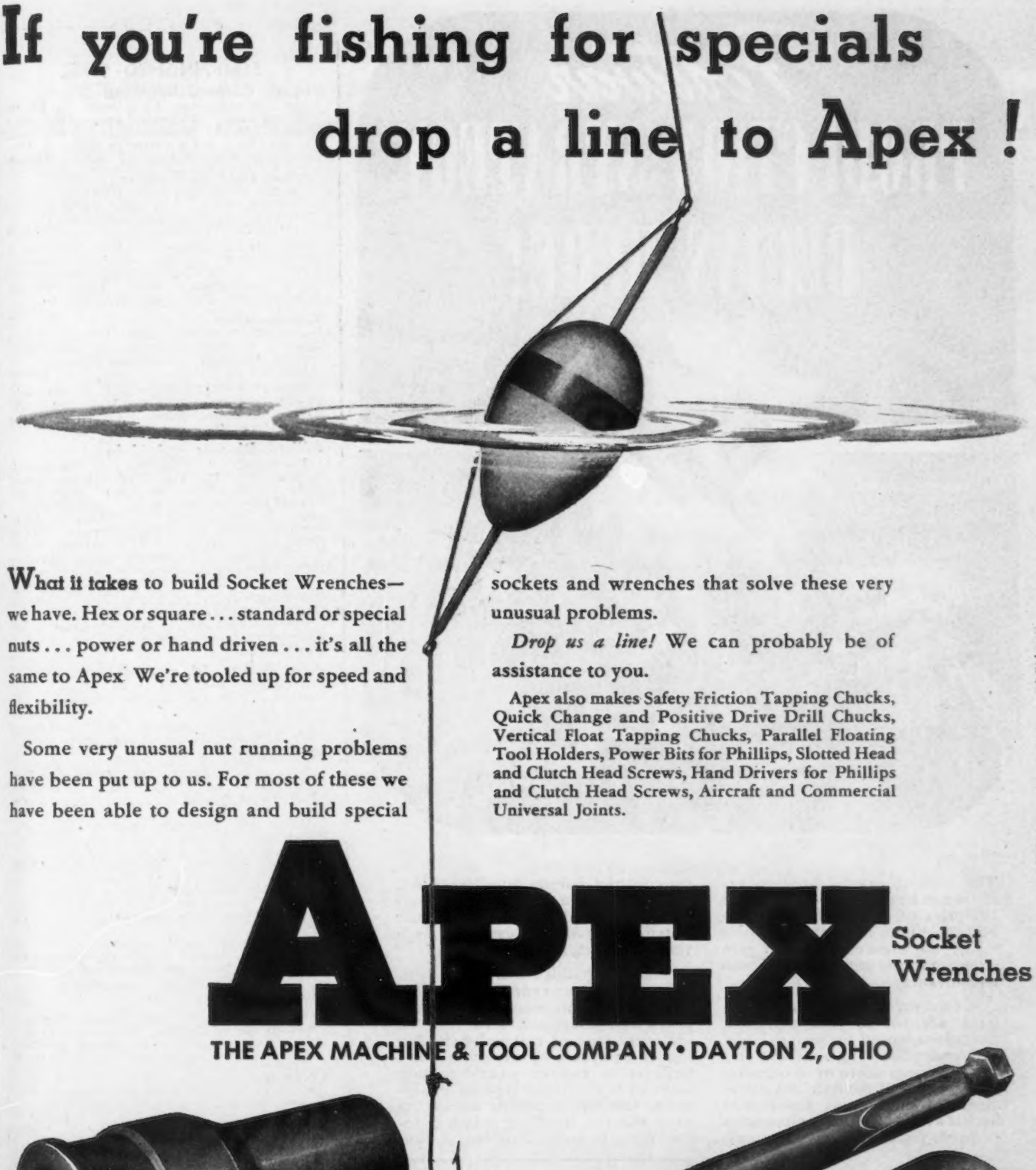
Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

If you're fishing for specials drop a line to Apex !



What it takes to build Socket Wrenches—we have. Hex or square . . . standard or special nuts . . . power or hand driven . . . it's all the same to Apex We're tooled up for speed and flexibility.

Some very unusual nut running problems have been put up to us. For most of these we have been able to design and build special sockets and wrenches that solve these very unusual problems.

Drop us a line! We can probably be of assistance to you.

Apex also makes Safety Friction Tapping Chucks, Quick Change and Positive Drive Drill Chucks, Vertical Float Tapping Chucks, Parallel Floating Tool Holders, Power Bits for Phillips, Slotted Head and Clutch Head Screws, Hand Drivers for Phillips and Clutch Head Screws, Aircraft and Commercial Universal Joints.

APEX Socket Wrenches

THE APEX MACHINE & TOOL COMPANY • DAYTON 2, OHIO

Postwar PRODUCTION STRATEGY BEGINS HERE!

The costs of material handling are known to be excessive—they add to the price of the finished product but contribute nothing to its sales value. Cut these costs and you gain a tremendously important competitive advantage.

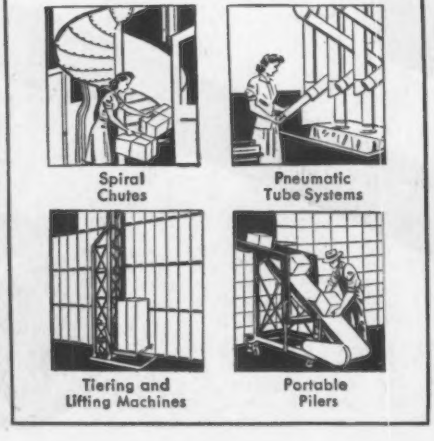
Conveyors and conveyor systems, adapted to your particular operations, speed up material and commodity handling activities, pull handling costs down to an economical level, speed the flow and movements of production. Conveyors handle a wide range of commodities — parts, packages, units, cartons, cans, bottles, barrels, bundles, drums, boxes. They are built in light, average, or heavy-duty types for either portable or stationary use—in a wide variety of sizes, styles and lengths.

Standard builds roller, belt, chain, slat, push bar conveyors; spiral chutes, tiering and lifting machines, portable pilers, and pneumatic tube systems, for every type of material handling and is equipped by experience and facilities to reduce your handling costs with the right type of equipment. Get the profitable answer to your material handling problem today. Write us for Bulletin No. IA-114.

STANDARD CONVEYOR CO.

General Offices: North St. Paul, Minn.

Sales and Service in Principal Cities



PRICES

SEMI-FINISHED STEEL

Ingots, Carbon, Rerolling

Base per gross ton, f.o.b. mill.... $31.00

Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast ports; Empire Sheet & Tinplate Co., $34.25; Pgh. Steel Co., $33.10.

Ingots, Carbon, Forging

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00

Exceptions: Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports; Pgh. Steel Co., $38.10.

Ingots, Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh $45.00

Exceptions: C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Provo, $11.20 higher. Delivered prices do not reflect three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Billets, Blooms, slabs

Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton $54.00

Price delivered Detroit $2.00 higher; E. Michigan, $3.00 higher.

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.

Price Exception: Follansbee Steel Corp. permitted to sell at $13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of $52.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(*No. 5 to 9/32 in.*)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(*F.o.b. Pittsburgh, Bethlehem, Syracuse*)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

The background of this advertisement from an unretouched photo of low carbon steel graphically illustrates the result of scientific processing under Kelite pH Control

SATISFACTORY?

This area shows surface condition often considered suitable for finishing or welding.

"pH"
is the Key to
SCIENTIFIC
Cleaning

The efficiency of many industrial cleaning operations often suffers from the inertia of tradition, or from disturbance by unknown chemical factors. A pH test and analysis by a Kelite Service Engineer may show you how to speed-up production and improve performance—how to save money, conserve man-hours.

**The improvements in painting, enameling, plating, galvanizing or welding, which result from such processing with pH control, give Industry the key to new standards of speed and excellence. The same principles apply to all cleaning operations, from dishwashing to metal finishing. Send for the facts about Kelite chemicals which clean through pH control.*

Manufacturing Plants in LOS ANGELES, CHICAGO, PERTH AMBOY, HOUSTON • Branches in Principal Cities

Chart Copyrt '42, Kelite Prod., Inc., 909 E. 60 St., Los Angeles 1

KELITE

SCIENTIFIC CLEANING THROUGH pH CONTROL

CLEAN!

This area shows improved surface condition after processing in Kelite solutions at correct pH*.

Best! FOR LIGHT DUTY Speed!

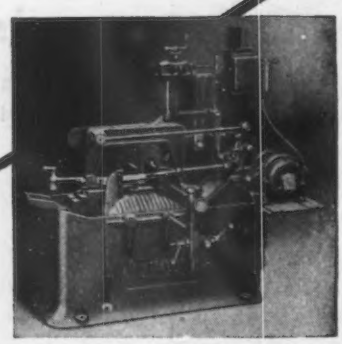
High Speed at Low Cost
No. 4B

For tool room, stock room, or maintenance shop, this 6" x 6" capacity hack saw is superior to anything in its price class. Embodies similar design principles and features of MARVEL Heavy Duty production saws. Cuts a 2" standard pipe in 30 seconds, a 5" round piece of machine steel in 8 minutes!

MARVEL SAWS

2-Speed and 4-Speed

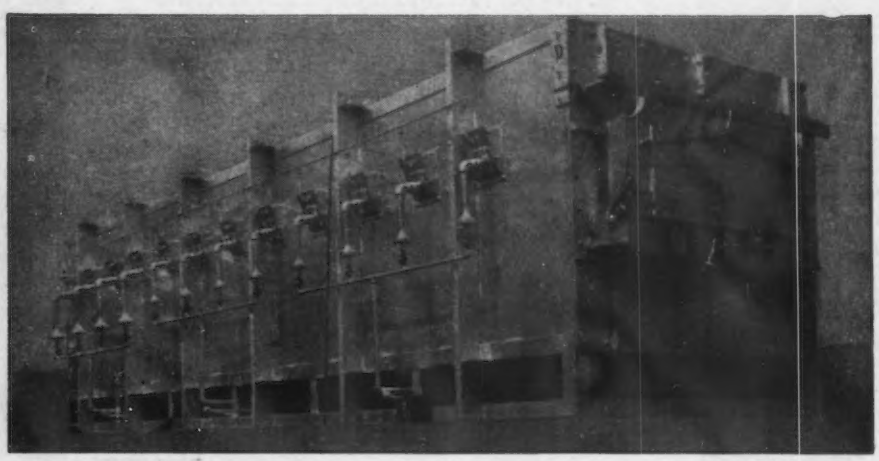
For applications where materials of different hardnesses and alloy characteristics are to be cut, MARVEL 4B is available in 2-Speed and 4-Speed models. Built-in work tracks for holding outer end of bars are also available for all models.



Complete Range of Metal Sawing Machines

Being the largest exclusive manufacturer of metal sawing machines and blades, both hack saw and band saw type, we have the correct answer to your cut-off problems. Each MARVEL model has a distinct application, so write us and we will send our catalog, price, and recommendation for the saw to fill your requirements most efficiently. MARVEL sawing engineers are also available to discuss and analyze your cut-off work. (Without obligation of course.)

ARMSTRONG-BLUM MFG. CO.
5700 W. Bloomingdale Ave., Chicago 39, Illinois, U.S.A.



BELLEVUE FURNACES
are designed for the job.

In the construction of Bellevue Furnaces, painstaking consideration of the job to be done comes first. Every factor must be evaluated, every condition studied. Only then do Bellevue engineers attempt design and recommendation of furnace type.

The soundness of that policy is being demonstrated in plant after plant. Hundreds of executives in scores of varied companies have proved, to their own satisfaction, the efficiency, speed, high production level and operating economies of Bellevues that were "designed" for the job.

You, too, will find Bellevue experience and facilities a profitable investment for your own furnace needs.

Send for full details.

BELLEVUE INDUSTRIAL FURNACE CO.
2974 BELLEVUE AVENUE — DETROIT, MICH.

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200.00 per Net Ton

	Black	Galv
Steel (Butt Weld)		
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
½ in.	24	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron (Same as Above)		
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

				Seamless Cold Drawn	*Seamless Hot Rolled*	*Lap Weld Hot Rolled*
2	in.	o.d.	13 B.W.G.	15.03	13.04	12.33
2½	in.	o.d.	12 B.W.G.	20.21	17.54	16.58
3	in.	o.d.	12 B.W.G.	22.48	19.50	18.35
3½	in.	o.d.	11 B.W.G.	28.37	24.62	23.13
4	in.	o.d.	10 B.W.G.	35.20	30.54	28.68

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

PRICES

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	Pacific Coast Basing Points†
	Base per Keg	
Standard wire nails	$2.55	$3.05
Coated nails	2.55	3.05
Cut nails, carloads	3.85	....
	Base per 100 lb.	
Annealed fence wire	$3.05	$3.55
Annealed galv. fence wire	3.40	3.90
	Base Column	
Woven wire fence*	.67	.85
Fence posts, carloads	.69	.86
Single loop bale ties	.59	.84
Galvanized barbed wire**	.70	.80
Twisted barbless wire	.70	....

*15½ gage and heavier. **On 80-rod spools in carload quantities.
†Prices subject to switching or transportation charges.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts
(f.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:
Base discount less case lots

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
⅞ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

⅛ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts *Base discount less keg lots*	U.S.S.	S.A.E.
7/16 in. and smaller	..	64
½ in. and smaller	62	..
⅝ in. through 1 in.	..	60
9/16 in. through 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 per cent additional discount.

Stove Bolts	*Consumer*
Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 40c per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets
(½ in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets
(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws	*Consumer Per Cent Off List*
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

ROOFING TERNE PLATE
(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20 lb. coating I.C.	7.50	15.00

"Curls" ... we thought he was a hairdresser until we found he was from Brooklyn and meant "coils" in a spring. No matter how you say it, when you talk springs, you're talking our language and we'll get along great ... without an interpreter ... for we try to be

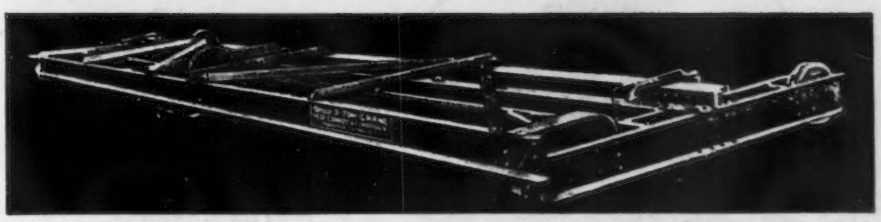
"Everybody's Spring Dept."

DUNBAR
BROTHERS CO.
DIV. OF ASSOCIATED SPRING CORP.
BRISTOL, CONN.

SPRINGS · WIRE FORMS · SMALL STAMPINGS

CONCO 3-Motor Single Girder CAB OR FLOOR OPERATED

ELECTRIC CRANE ...



● Available in capacities of one through five tons for floor or cab operation. Simply, ruggedly designed for low first cost and maintenance. Used with Low Headroom Type Hoist, provides for maximum space coverage horizontally and vertically. Effective in even a minimum space. Write for Bulletin 2000.

Write for Bulletin 26000 describing the Torpedo Hoist shown. Three capacities 250 lb. — $139.50, 500 lb. — $149.50, 1000 lb. — $159.50. Heavily, simply built, with Push Button Control. Outstanding in CONCO'S complete line of hand-powered and electric Cranes, Hoists, Trolleys.

CONCO ENGINEERING WORKS
Div of H. D. Conkey & Co. — 15 Grove St. — Mendota, Ill.
Builders Of Conco Torpedo Electric Hoist

PIG IRON

All prices set in bold face type are maximum established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maximum. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	ow Phos-phorus	Charcoal
Boston	*$25.50*	*$25.00*	*$26.50*	*$26.00*	.....	.....
Brooklyn	*27.50*	*27.00*	.....	*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia (4)	*25.86*	*25.34*	*26.86*	*26.36*	*$30.74*	.....
Bethlehem, Pa.	$25.00	$24.50	$28.00	$25.50	.....	.....
Everett, Mass.	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	$29.50	.....
Birdsboro, Pa. (3)	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa. (1)	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati, Ohio	*25.11*	*24.61*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	.....*$37.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	...	.....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	.....
Hamilton, Ohio	24.00	23.50	....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown	24.00	23.50	24.50	24.00	*32.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	34.00
Lyles, Tenn., fc. (2)	.....	.....	.....	.....	.....	33.00
St. Paul	*26.63*	26.13	*27.1*	*26.63*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	...	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron & Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable. Struthers Iron & Steel Co. may add another $1.00 per gross ton for iron from Struthers, Ohio, plant.

(2) Price shown is for low-phosphorus iron; high phosphorus sells for $28.50 at the furnace.

(3) E. & G. Brooke Co., Birdsboro, Pa., permitted to charge $1.00 per ton extra.

(4) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 to 2.25 per cent). Phosphorus differentials, a reduction of 3$c. per ton for phosphorus content of 0.70 per cent and over; Manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, c. per lb., ton lots.

Copper, electrolytic, 150 and 200 mesh	21⅛ to 23½c.
Copper, reduced, 150 and 200 mesh	20½ to 25½c.
Iron, commercial, 100 and 200 mesh 96 + % Fe	13½ to 18c.
Iron, crushed, 200 mesh and finer, 90 + % Fe, carload lots	4c.
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe, drum lots	63c.
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	43c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c.
Aluminum, 100 and 200 mesh	*23 to 27c.
Antimony, 100 mesh	20.5c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.05
Lead, 100, 200 & 300 mesh, 11½ to 12½c.	
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh, 8½c. plus metal	
Tin, 100 mesh	58½c.
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00

*Freight allowed east of Mississippi.

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$7.00*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	8.35
Foundry, By-Product	
Chicago, del'd	13.35
Chicago, f.o.b.	12.60
New England, del'd	14.25
Kearny, N. J., f.o.b.	12.65
Philadelphia, del'd	12.85
Buffalo, del'd	13.00
Portsmouth, Ohio, f.o.b.	11.10
Painesville, Ohio, f.o.b.	11.75
Erie, del'd	12.75
Cleveland, del'd	12.80
Cincinnati, del'd	12.85
St. Louis, del'd	13.35
Birmingham, del'd	10.50

*Hand drawn ovens using trucked coal permitted to charge $7.75 per ton plus transportation charges.

ERIE BUCKETS

General Purpose
Dredging and Hard Digging
Dragline
Material Handlers
Hook-on Type
Ore Handling
Coal and Coke
4-Rope
Barge Type
Strayer Electric

THE COMPLETE LINE

Write for Data

Above types built in weights and capacities to suit your crane and job requirements.

ERIE STEEL CONSTRUCTION CO.
ERIE, PENNSYLVANIA
Aggre Meters • Buckets • Concrete Plants • Traveling Cranes

PRICES

REFRACTORIES
(*F.o.b. Works*)

Fire Clay Brick

	Per 1000
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Sec. quality, New Jersey	51.00
No. 1 Ohio	43.00
Ground fire clay, net ton	7.60

Silica Brick

Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00

Chrome Brick

	Per Net ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick

Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

RAILS, TRACK SUPPLIES
(*F.o.b. Mill*)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$40.00
Angle splice bars, 100 lb.	2.70

(*F.o.b. Basing Points*)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plate, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

CORROSION AND HEAT-RESISTING STEEL
(*Per lb. base price, f.o.b. Pittsburgh*)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F. Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

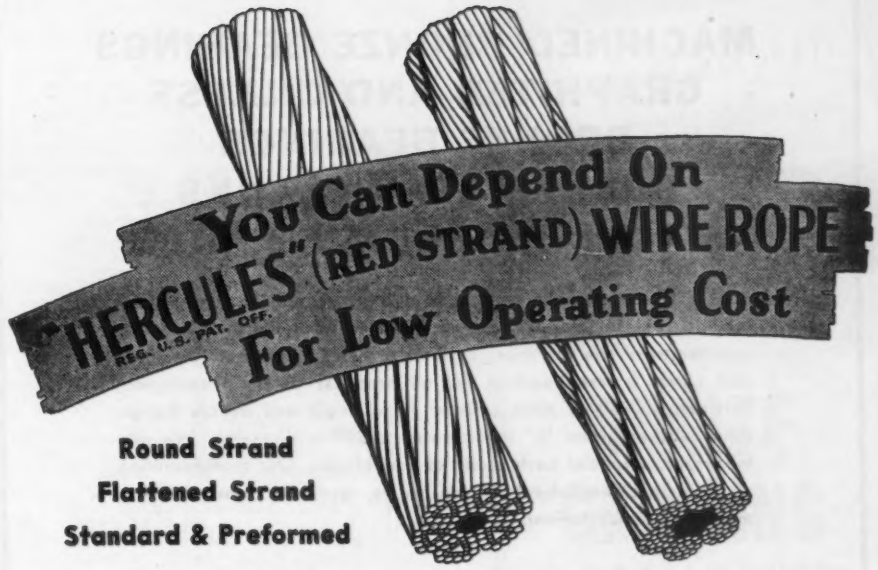
	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

ELECTRICAL SHEETS
(*Base, f.o.b. Pittsburgh*)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.



Round Strand
Flattened Strand
Standard & Preformed

WHY not let "HERCULES" (Red-Strand) Wire Rope help you meet present day production requirements and still maintain a reasonable margin of profit? You will quickly discover that "HERCULES" is a dependable ally—not only in today's fight against increasing operating costs—but also in your endeavor to speed up production.

Made Only By **A. LESCHEN & SONS ROPE CO.** *Established 1857*
5909 Kennerly Avenue, St. Louis 12, Mo.
New York • Chicago • Denver • San Francisco • Seattle • Portland

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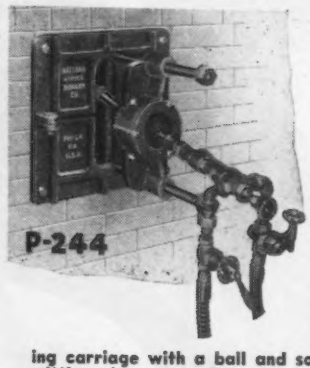

Movable Flame Billet Heating Oil Burner

In this clean burning unit, the burner is arranged on a sliding carriage with a ball and socket adapter, permitting placement of the flame to any part of the furnace, easily, exactly. It also makes it simple to withdraw the burner for the inspection or replacement of the tip.

A Type SA burner (see below) is supplied with this unit with an extension tip for firing heavy oil or tar. Steam or compressed air is used for atomization. Its Venturi throat and internal expansion insures fine atomization and low steam or air consumption. Holds steady as a gas flame. Tips for cone, round or flat flame of any angle.

NATIONAL AIROIL FUEL OIL - GAS BURNERS

Steam Atomizing Oil Burners—Mechanical Pressure Atomizing Oil Burners—Low Air Pressure Oil Burners—Motor-driven Rotary Oil Burners—Industrial Gas Burners—Combination Gas and Oil Burners—Fuel Oil Pumping Units—Fuel Oil Heaters—Fuel Oil Strainers and other accessories.

For details—write

Cross Section of Type SA Oil Burner

NATIONAL AIROIL BURNER COMPANY, INCORPORATED

1271 East Sedgley Ave., Philadelphia 34, Pa.

ESTABLISHED 1912 *INCORPORATED 1917*

PRICES

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. cars at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Carload lots (packed)	141.00
Less ton lots (packed)	148.50

$1.70 for each 1% above 82% Mn penalty, $1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	36c.
L.c.l. lots	38c.

95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.

Carload, bulk	34c.
L.c.l. lots	36c.

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed.

	Eastern Zone	Central Zone	Western Zone
50% Si	6.65c.	7.10c.	7.25c.
75% Si	8.05c.	8.20c.	8.75c.
80-90% Si.	8.90c.	9.05c.	9.55c.
90-95% Si.	11.05c.	11.20c.	11.65c.

Spot sales add: 45c. per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb. for 80-90% and 90-95% Si.

Silvery Iron

(C/L, Per Gross Ton, base 6.00 to 6.50 Si)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorous or over.

*OPA price established 6-24-41.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk.	3.35c.	3.50c.	3.65c.
2000 lb.-carload	3.8c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05c.
2000 lb. to carload	6.70c.
Under 2000 lb.	6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.
2000 lb. to carload	6.30c.
Less ton lots	6.55c.

Ferrochrome

(65-72% Cr, 2% max. Si)

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr, 4-10% C	13.00c.	13.40c.	14.00c.
62-66% Cr, 5-7% C	13.50c.	13.90c.	14.50c.

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2c. per lb. to regular low-carbon ferrochrome price schedule. Add 2c. for each additional 0.25% N. High-carbon type: 66-71% Cr, 4-5% C, 0.75% N. Add 5c. per lb. to regular high-carbon ferrochrome price schedule.

Low-Carbon Ferromanganese

Contract prices per lb. of manganese contained, lump size, f.o.b. shipping point, freight allowed to destination, Eastern Zone. Add 0.25c. for spot sales.

	Carloads, Bulk	Ton Lots	Less Ton
0.10% max. C, 1 or 2% max. Si	23.00c.	23.40c.	23.65c.
0.15% max. C, 1 or 2% max. Si	22.00c.	22.40c.	22.65c.
0.30% max. C, 1 or 2% max. Si	21.00c.	21.40c.	21.65c.
0.50% max. C, 1 or 2% max. Si	20.00c.	20.40c.	20.65c.
0.75% max. C, 7.00% max. Si	16.00c.	16.40c.	16.65c.

Ferrochrome Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 60 per cent contained chromium. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	8.25c.	8.55c.	8.95c.
Ton lots	8.75c.	9.25c.	10.75c.
Less ton lots	9.00c.	9.50c.	11.00c.

Ferromanganese Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 66 per cent contained manganese. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	6.05c.	6.30c.	6.60c.
Ton lots	6.55c.	7.55c.	8.55c.
Less ton lots	6.80c.	7.80c.	8.80c.

Calcium—Manganese—Silicon

Contract prices per lb. of alloy, lump size, f.o.b. shipping point, freight allowed to destination.

16-20% Ca, 14-18% Mn, 53-59% Si. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carloads	15.50c.	16.00c.	18.05c.
Ton lots	16.50c.	17.35c.	19.10c.
Less ton lots	17.00c.	17.85c.	19.60c.

Calcium Metal

Eastern zone contract prices per lb. of metal, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. Add 0.9c. for Central Zone; 0.49c. for Western Zone.

	Cast	Turnings	Distilled
Ton lots	$1.80	$2.30	$5.00
Less ton lots	2.30	2.80	5.75

Chromium—Copper

Contract price per lb. of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi River. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si. Add 2c. for spot sales.

Shot or ingot ..... 45c.

Ferroboron

Contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern Zone	Central Zone	Western Zone
Ton lots	$1.20	$1.2075	$1.229
Less ton lots	1.30	1.3075	1.329

Manganese—Boron

Contract prices per lb. of alloy, f.o.b. shipping point, freight charges allowed. Add 5c. for spot sales.

75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

	Eastern Zone	Central Zone	Western Zone
Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.055

Nickel—Boron

Spot and contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination.

15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

	Eastern Zone	Central Zone	Western Zone
11,200 lb. or more	$1.90	$1.9125	$1.9445
Ton lots	2.00	2.0125	2.0445
Less ton lots	2.10	2.1125	2.1445

Other Ferroalloys

Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten, 10,000 lb. or more.... $1.90

Ferrovanadium, 35-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va.

Open hearth	$2.70
Crucible	$2.80
Primos	$2.90

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal..... $1.50

Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5. Spot sales add 5c. per lb. contained V_2O_5..... $1.10

Ferroboron, contract basis, 17.50% min., Bo, f.o.b. producer's plant with usual freight allowances, per lb. of alloy.

2000 lb. to carload	$1.20
Under 2000 lb.	1.30

Silcaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)

Carload lots	25c.
2000 lb. to carload	26c.

Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)

Carload lots	58c.
2000 lb. to carload	59c.

Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis

No. 1	87.5c.
No. 6	60c.
No. 79	45c.

Bortram, f.o.b. Niagara Falls

Ton lots, per lb.	45c.
Less ton lots, per lb.	50c.

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb. contained Cb.

2000 lb. lots	$2.25
Under 2000 lb. lots	$2.30

Ferrotitanium, 40%-45%, 0.10% C. max. f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained Ti.

	$1.23
Less ton lots	$1.25

Ferrotitanium, 20%-25%, 0.10% C. max., ton lots, per lb. contained titanium

	$1.35
Less ton lots	$1.40

High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per carload..... $142.50

Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton..... $58.50

Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton $75.00

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per lb. contained Mo. 95c.

Calcium molybdate, 40%-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo. ..... 80c.

Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo..... 80c.

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo ..... 80c.

Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ¼c. for spot sales

Carload lots	14c.

Zirconium, 12-15%, contract basis, lump f.o.b. plant usual freight allowances, per lb. of alloy

Carload, bulk	4.6c.

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk ..... 5.75c.

Ton lots	7.25c.

Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.

Car lots	8.75c.
Ton lots	9.25c.

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OAKITE GRINDING COMPOUND

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Gives specific directions and formulas for using Oakite Grinding Compound. Also contains formulas for cutting and machining ferrous and non-ferrous metals. Write for your FREE copy TODAY!

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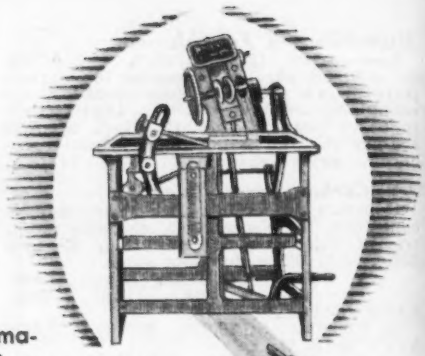
ALREADY "OF AGE"

50 YEARS AGO



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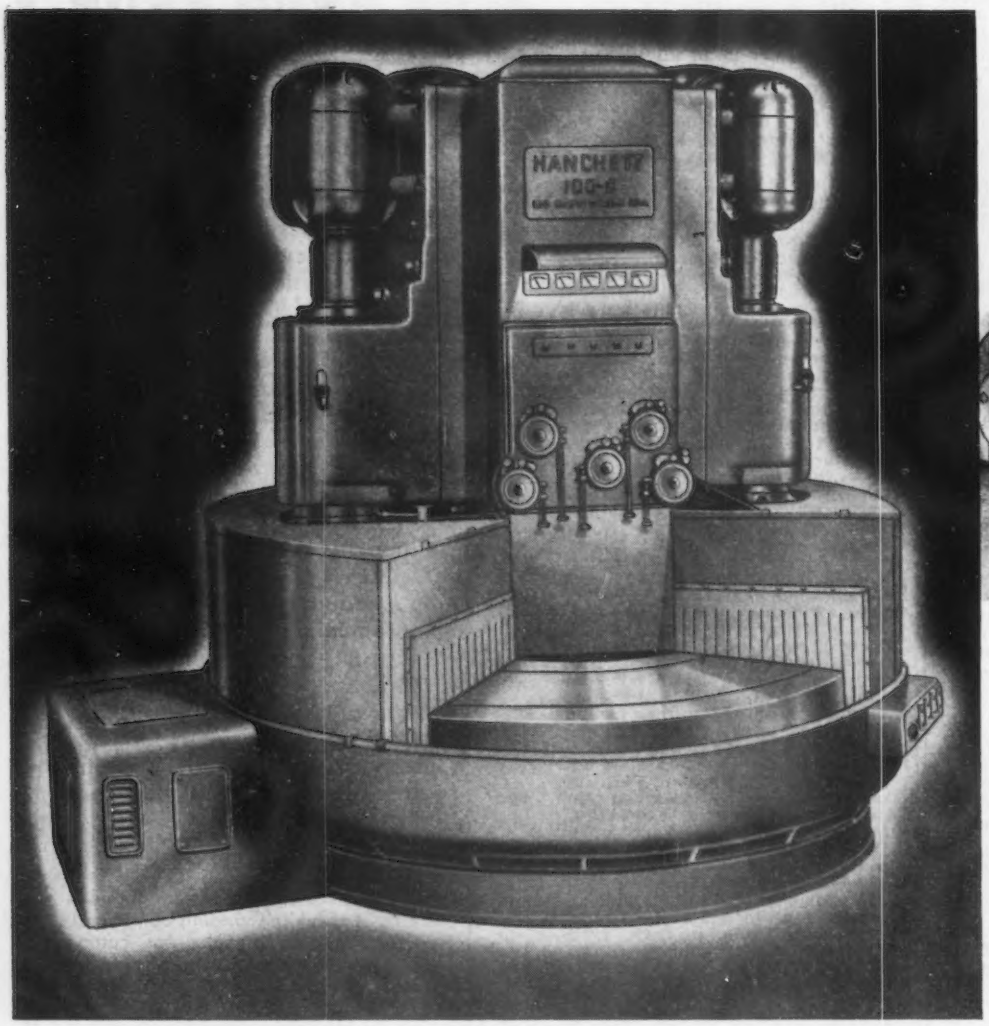

1944

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HANCHETT MANUFACTURING CO.
BIG RAPIDS, MICHIGAN U.S.A.